

ORDER NO. KMF0105292S1

F7

Service Manual

Compact Plain Paper Fax/Multi Function Plain Paper Fax

**KX-FP245 / KX-FP250 / KX-FP250C / KX-FM260 / KX-FP270 /
KX-FP270C / KX-FM280 / KX-FM280C
(for U.S.A.)
(for Canada)**

SPECIFICATIONS

Panasonic

1. FORMER SUPPLEMENT

1.1. Sup No. 2 or Sup No. 3 (KMF0103276S1)





Note:

Supplement No. 1~2 have already supplied with printed matter. Please refer to that.

2. REPLACEMENT PARTS LISTS

2.1. REFERENCE CHART

Reason for Change	
*The following items (1-8) indicate the reason for change. See the “Notes” column for each part in ORIGINAL AND NEW PARTS COMPARISON LISTS .	
1. Improve performance	Remarks: *a: To share the part with other models.
2. Change of material or dimension	
3. To meet approved specification	
4. Standardization	
5. Addition	
6. Deletion	
7. Correction	
8. Other	

Interchangeability Code			
**The following items (V-Z) indicate the interchangeability. See the “Notes” column for each part in ORIGINAL AND NEW PARTS COMPARISON LISTS .			
V	Original New	 Early (before change) Late (after change)	Original or new parts may be used in early or late production sets. Use original parts until exhausted, then stock new parts.
W	Original New	 Early (before change) Late (after change)	Original parts may be used in early production sets only. New parts may be used in early or late production sets. Use original parts possible, then stock new parts.
X	Original New	 Early (before change) Late (after change)	New parts only may be used in early or late production sets. Stock new parts.
Y	Original New	 Early (before change) Late (after change)	Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.

Interchangeability Code		
**The following items (V-Z) indicate the interchangeability. See the “Notes” column for each part in <u>ORIGINAL AND NEW PARTS COMPARISON LISTS</u> .		
	Parts	Set Production
Z	Other	

Note:

Alphabets in the “Remarks” column in the following lists correspond to the alphabets in the “Remarks” in REFERENCE CHART.

2.2. ORIGINAL AND NEW PARTS COMPARISON LISTS

Ref No.	Part No.		Part Name & Descriptions	Pcs/Set	Remarks	N
	Original Part No.	New Part No.				
CABINET AND ELECTRICAL SECTION						
64	PFDE1034Y	PFDE1034X	GUIDE, HEAD HOLDER	1	*a	1
67	PFDE1035Y	PFDE1035X	GUIDE, HEAD HOLDER	1	*a	1

TN / KXFP245, KXFP250, KXFP250C / KXFM260, KXFP270, KXFP270C / KXFP280, KXFP280C

Service Manual

PLAIN PAPER FACSIMILE



KX-FP245, KX-FP250, KX-FP270
KX-FM260, KX-FM280
KX-FP250C, KX-FP270C
KX-FM280C

Please file and use this supplement manual together with the original and simplified service manuals for the following models.





Model	Order No.	Supplement No.	Country	Issued printed matter of supplement No.
KX-FP245	KM79805206A1	2	U.S.A.	1
KX-FP250	KM79803200C1	2		1
KX-FP270	KM79806211C1	2		1
KX-FM260	KM79805207C1	3		1~2
KX-FM280	KM79807219C1	2		1
KX-FP250C	KM79805211A1	2	CANADA	1
KX-FP270C	KM79807221A1	2		1
KX-FM280C	KM79808225A1	2		1

WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

1 REPLACEMENT PARTS LIST(S)

1.1. REFERENCE CHART

Reason for Change		
*The following items (1-8) indicate the reason for change. See the "Notes" column for each part in ORIGINAL AND NEW PARTS COMPARISON LIST(S) .		
1. Improve performance	Remarks: *a: For Prevention of static electricity.	
2. Change of material or dimension		
3. To meet approved specification		
4. Standardization		
5. Addition		
6. Deletion		
7. Correction		
8. Other		
Interchangeability Code		
**The following items (V-Z) indicate the interchangeability. See the "Notes" column for each part in ORIGINAL AND NEW PARTS COMPARISON LIST(S) .		
Parts	Set Production	
V Original New	 Early (before change) Late (after change)	Original or new parts may be used in early or late production set. Use original parts until exhausted, then stock new parts.
W Original New	 Early (before change) Late (after change)	Original parts may be used in early production sets only. New parts may be used in early or late production sets. Use original parts where possible, then stock new parts.
X Original New	 Early (before change) Late (after change)	New parts only may be used in early or late production sets. Stock new parts.
Y Original New	 Early (before change) Late (after change)	Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.
Z Other		

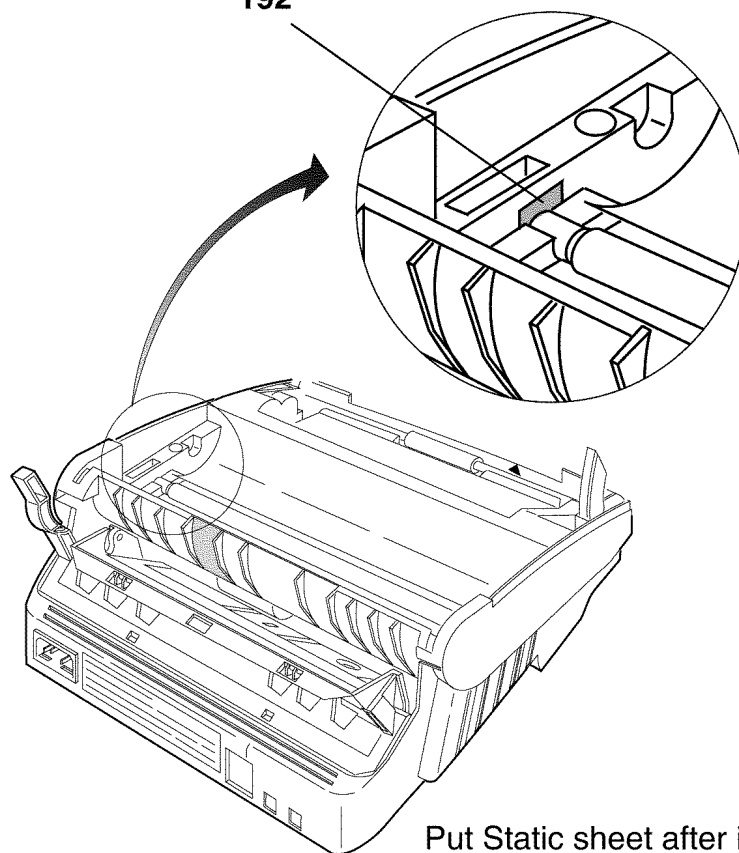
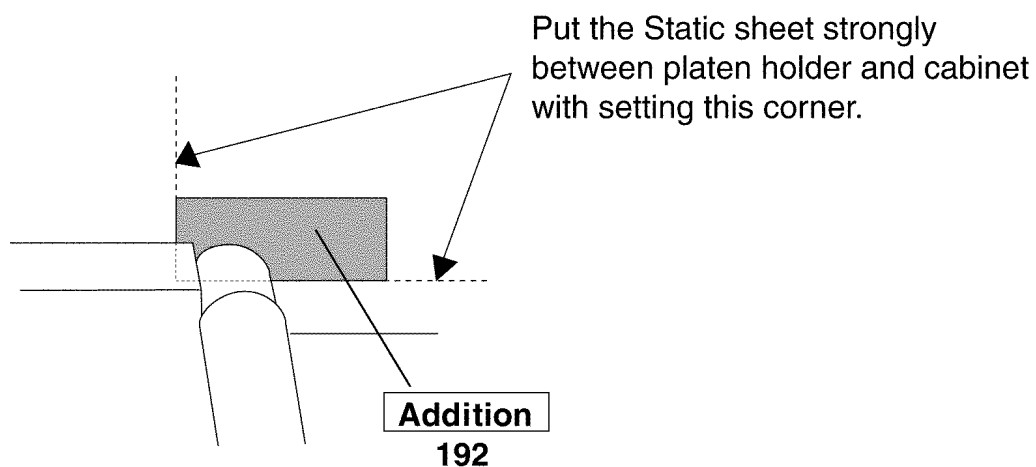
Note:

Alphabets in the "Remarks" column in the following lists correspond to the alphabets in the "Remarks" in **REFERENCE CHART**.

1.2. ORIGINAL AND NEW PARTS COMPARISON LIST(S)

Ref No.	Part No.		Part Name & Descriptions	Pcs	Remarks	Notes		Time of change (Suffix)
	Original Part No.	New Part No.						
CABINET AND ELECTRICAL PARTS								
146	PFUS1122Z	PFUS1122Y	SPRING, EARTH	1	*a	1	V	
192	-----	PFHX1267Z	STATIC SHEET, See Fig.1	1	*a	5		
POWER SUPPLY BOARD PARTS								
PC101	0N3131S	0N3131SKU	PHOTO ELECTRIC TRANSDUCER	1		7		

2 MECHANICAL SECTION



Put Static sheet after installing
PLATEN ROLLER (Ref No.133 PFDN1010)
and EARTH SPRING (Ref No.146 PFUS1122).

N.T.
KXFP245, KXFP250
KXFP270, KXFM260
KXFM280, KXFP250C
KXFP270C, KXFM280C

When you note the serial number, write down all 11 digits. The serial number may be found on the bottom of the unit.

TABLE OF CONTENTS

	Page
INTRODUCTION	
Safety Precautions	5
Insulation Resistance Test	5
For Service Technicians	5
Battery Caution	5
AC Caution	6
Personal Safety Precautions	6, 7
Service Precautions	7
Features	8
Specifications	9
Optional Accessories	9
CCITT No.1 Test Chart	10
Location of Controls	11, 12
Connections	13
Installation	14~21
Maintenance Items and Component Locations	22~24
TROUBLESHOOTING GUIDE	
Troubleshooting Summary	26
User Recoverable Errors	27, 28
Troubleshooting Details	29~91
Programming and Lists	92~104
Test Functions	105~110
ADJUSTMENTS	
Table of Test Equipment and Tools	113
Adjusting the Feeder Pressure	113
Confirming the Separation Spring	113
CCD Adjustments	114~117
Document Read Start Position Adjustment	119
DISASSEMBLY INSTRUCTIONS	
Disassembly Instructions	121~131
How to Replace the Flat Package IC	132, 133

CIRCUIT OPERATIONS

Connection Diagram	136
General Block Diagram	137, 138
Control Section	139~149
Facsimile Section	149~161
MODEM Section	162~168
Description of Analog Section Block Diagram	169, 170
NCU Section	171, 172
ITS and Monitor Section	173
ATAS Interface Section	173
Analog Gate Array	174, 175
Operation Board Section	176
LCD Section	177
Power Supply Board Switching Section	178~180
PRINTED CIRCUIT BOARD (DIGITAL BOARD)	183, 184
SCHEMATIC DIAGRAM (DIGITAL CIRCUIT)	185
SCHEMATIC DIAGRAM (ANALOG CIRCUIT)	186
PRINTED CIRCUIT BOARD (ANALOG BOARD)	187, 188
SCHEMATIC DIAGRAM AND PRINTED CIRCUIT BOARD(CCD)	189
PRINTED CIRCUIT BOARD (POWER SUPPLY SWITCHING BOARD)	190
SCHEMATIC DIAGRAM (POWER SUPPLY SWITCHING CIRCUIT)	191
PRINTED CIRCUIT BOARD (OPERATION BOARD)	192
SCHEMATIC DIAGRAM (OPERATION CIRCUIT)	193
PRINTED CIRCUIT BOARD (SENSOR)	194
TERMINAL GUIDE OF THE IC'S TRANSISTORS AND DIODES	195
FIXTURES AND TOOLS	196
CABINET, MECHANICAL AND ELECTRICAL PARTS LOCATION	197~203
ACCESSORIES AND PACKING MATERIALS	204
REPLACEMENT PARTS LIST	205~215

INTRODUCTION

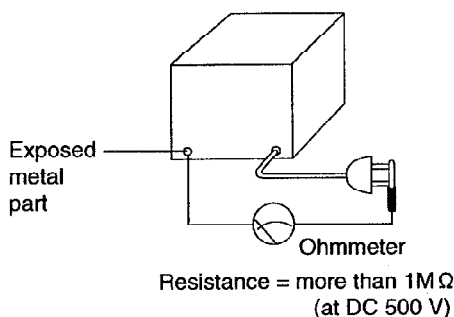
	Page
Safety Precautions	5
Insulation Resistance Test	5
For Service Technicians	5
Battery Caution	5
AC Caution	6
Personal Safety Precautions	6, 7
Service Precautions	7
Features	8
Specifications	9
Optional Accessories	9
CCITT No.1 Test Chart	10
Location of Controls	11, 12
Connections	13
Installation	14~21
Maintenance Items and Component Locations	22~24

SAFETY PRECAUTIONS

1. Before servicing, unplug the AC power cord to prevent an electric shock.
2. When replacing parts, use only the manufacturer's recommended components.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to perform the following insulation resistance test to prevent the customer from being exposed to shock hazards.

INSULATION RESISTANCE TEST

1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with an ohmmeter between the jumpered AC plug and each exposed metal cabinet part (screwheads, control shafts, bottom frame, etc.).
Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.
4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.



FOR SERVICE TECHNICIANS

ICs and LSIs are vulnerable to static electricity.

When repairing, the following precautions will help prevent recurring malfunctions.

- 1) Cover the plastic part's boxes with aluminum foil.
- 2) Ground the soldering irons.
- 3) Use a conductive mat on the worktable.
- 4) Do not touch the IC or LSI pins with bare fingers.

BATTERY CAUTION

CAUTION

Danger of explosion if the battery is replaced incorrectly. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to following caution:

Disposal of lithium batteries should be performed by permitted, professional disposal firms knowledgeable in state government federal and local hazardous materials and hazardous waste transportation and disposal requirements.

A battery continues to have no transportation limitations as long as it is separated to prevent short circuits and packed in strong packaging.

Commercial firms that dispose of any quantity of lithium cells should have a mechanism in place to account for their ultimate disposition. This is a good practice for all types of commercial or industrial waste.

Recommend Type Number: CR2032 (BATT)
CR2032 (BATT)

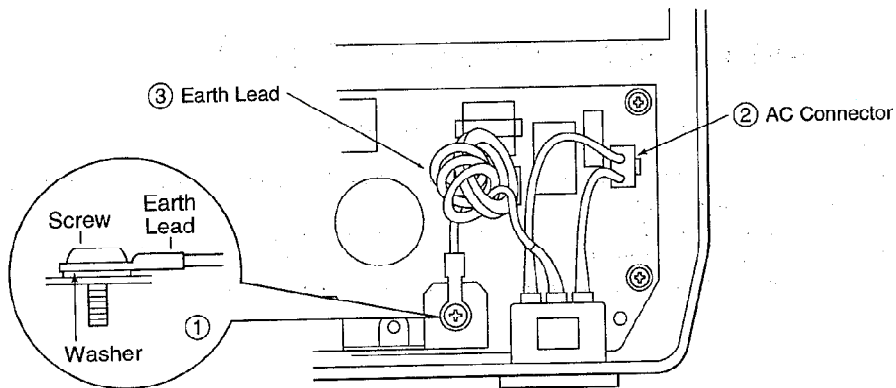
Manufactured by MATSUSHITA
Manufactured by SONY

AC CAUTION

For safety, before closing the lower cabinet, please make sure of the following precautions.

- ① The earth lead is fixed with the screw.
- ② The AC connector is connected properly.
- ③ Wrap the earth lead around the core 3 times.

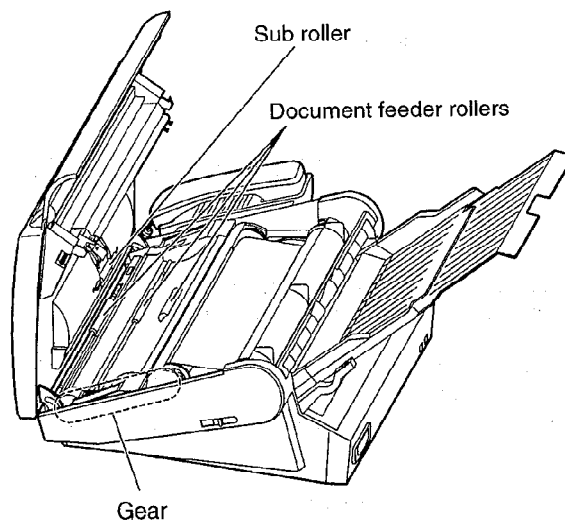
(BOTTOM VIEW)



PERSONAL SAFETY PRECAUTIONS

1. MOVING SECTIONS OF THE UNIT

Be careful not to let your hair, clothes, fingers, accessories, etc., become caught in any moving sections of the unit. The moving sections of the unit are the rollers and a gear. There is a separation roller and a document feed roller which are rotated by the document feed motor. A gear rotates the two rollers. Be careful not to touch them with your hands, especially when the unit is operating.



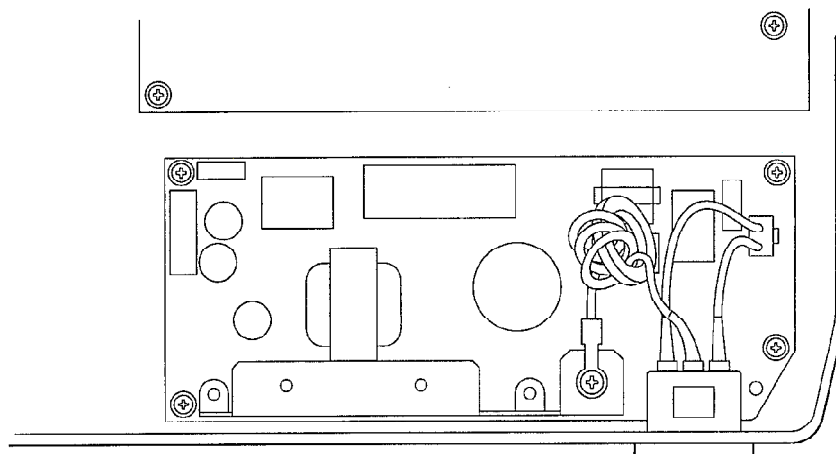
2. LIVE ELECTRICAL SECTIONS

All the electrical sections of the unit supplied with AC power by the AC power cord are live. Never disassemble the unit for service with the AC power supply plugged in.



AC voltage is supplied to the primary side of the power supply unit. Therefore, always unplug the AC power cord before disassembling for service.

Be careful of "High Voltage" in this area.



(Bottom view)

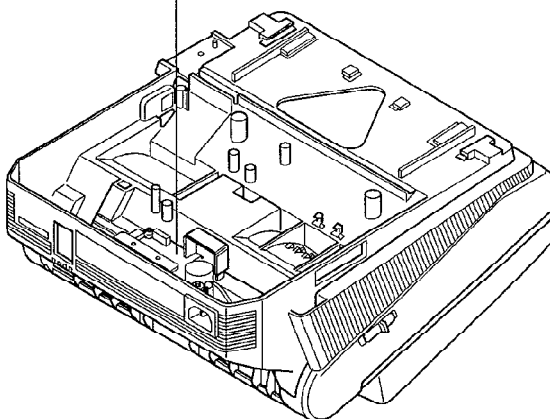
SERVICE PRECAUTIONS

1. PRECAUTIONS TO PREVENT DAMAGE FROM STATIC ELECTRICITY

Electrical charges accumulate on a person. For instance, clothes rubbing together can damage electric elements or change their electrical characteristics. In order to prevent static electricity, touch a metallic part that is grounded to release the static electricity. Never touch the electrical sections such as the power supply unit, etc.



Electrostatic Discharge!



FEATURES

General

- Help function

- Display:
1. HOW TO SET UP
 2. JOG/AUTO DIAL
 3. TAD OPERATION
 4. FAX SENDING
 5. FAX RECEIVING
 6. COPIER
 7. Q and A
 8. ERRORS
 9. REPORTS
 10. CALLER ID

- LCD (Liquid Crystal Display) readout

- IQ-FAX™ (for U.S.A. only)

This feature can only be used by those who apply to the FaxSav service.

IQ-FAX is intelligent faxing which allows you to send faxes via the internet by using the IQ-FAX button. Behind the IQ-FAX button is the FaxSav Global Fax Network which manages the delivery of your fax to any fax machine in the world. It routes your fax via the best and most time efficient route and will automatically resend your fax for you, if the receiving fax machine is unavailable.

This "fax-only" network has the added advantage of cost efficiency due to the internet being integrated into the net work. Every fax is secure since the FaxSav network utilizes the highest encryption legally allowed, ensuring that your documents stay secure. You get the benefits of carefree faxing with savings associated with the use of the internet. It is simple, quick, and secure.

Digital Answering System

- Voice Time/Day Stamp
- 18-Minutes recording time
- Voice guidance for remote operation
- Voice and fax paper call

Plain Paper Facsimile Machine

- 9 second transmission speed *
- 15 second transmission speed **
- Letter/Legal, G3 compatible
- Automatic document feeder (15 sheets)
- 10 stations one-touch dialer
- Broadcast (up to 109 station)
- Resolution : Standard/Fine/Super fine/Half tone (64 level)
- LCD Contrast : Normal/Darker
- Delayed transmission
- Polling function
- Overseas transmission function
- Remote FAX receiving using an extension phone
- 150-sheet paper capacity
- Automatic fax/phone switching
- Distinctive ring detection ***
- High speed 14400 bps fax modem
- Out of paper reception (up to 28 papers) ****

* The 9 second speed is based upon the CCITT No. 1 Test Chart on the condition that memory transmission is performed.

** The 15 second speed is based upon the CCIT No. 1 Test Chart.

*** Subscription to distinctive ring services required.

**** 350KB memory. Actual number of Pages depends upon the contents of the Pages and the resolution. 28-page capacity based upon CCITT No. 1 Test Chart at standard resolution.

Large Memory (28 pages) ※ Performed by DRAM

Approx. 28 pages of memory reception
Approx. 25 pages of memory transmission

Integrated Telephone System

- On-hook dialing
- Digital duplex speakerphone
- Voice muting
- Redialing function
- 100-Station telephone directory with *Jog Dial*
- One-Touch dial (5x2 Phone Numbers)

Copier function

- Multi-copy function (up to 99 copies)
- Enlargement and reduction
- Collate
- 64-Level halftone
- Electronic film indicator

SPECIFICATIONS

These specifications are for the U.S.A. version only.
Refer to the simplified manual (cover) for other areas.

Applicable Lines:	Public Switched Telephone Network
Document Size:	Max. 216 mm (8½") in width Max. 600 mm (23⅝") in length
Effective Scanning Width:	208 mm (8⅞")
Recording Paper Size:	Letter: 216×279 mm (8½"×11") Legal: 216×356 mm (8½"×14")
Effective Printing Width:	208 mm (8⅞")
Transmission Time*:	Approx. 9 sec./page (Original mode)** Approx. 15 sec./page (Original mode)*** Approx. 30 sec./page (G3 Normal mode)
Scanning Density:	Horizontal: 8 pels/mm (203 pels/inch) Vertical: 3.85 lines/mm (98 lines/inch)—STANDARD mode 7.7 lines/mm (196 lines/inch)—FINE/HALF TONE mode 15.4 lines/mm (392 lines/inch)—SUPER FINE Mode
Halftone Level:	64-level
Scanner Type:	CCD Image Sensor
Printer Type:	Thermal Printing
Data Compression System:	Modified Huffman (MH), Modified READ (MR)
Modem Speed:	14,400/12,000/9,600/7,200/4,800/2,400 bps; Automatic Fallback
Operating Environment:	5–35°C (41–95°F), 20–80 % RH(Relative Humidity)
Dimensions (H×W×D):	154×365×355 mm (6⅛"×14⅜"×13⅜")
Mass (Weight):	Approx. 4.85 kg (10.7 lb.)
Power Consumption:	Standby: Approx. 6.0 W Transmission: Approx. 14 W Reception: Approx. 37 W (When receiving a 20% back document) Copy: Approx. 48 W (When copying a 20% back document) Maximum: Approx. 160 W (When using a 100% back document)
Power Supply:	120 V AC, 60 Hz (This unit will not function at 50 Hz.)
Memory Capacity:	Voice memory: Approx. 18 minutes of recording time including the greeting message**** Fax memory: Approx. 28 pages memory reception Approx. 25 pages memory transmission (Based on CCITT No. 1 Test Chart in standard resolution.)

* Transmission speed depends upon the contents of the pages, resolution, telephone line conditions and capability of the receiving unit.

** The 9 second speed is based upon the CCITT No. 1 Test Chart on the condition that memory transmission is performed. (Refer to next page.)

*** The 15 second speed is based upon the CCITT No. 1 Test Chart . (Refer to next page.)

**** Recording time may be reduced by the calling party's background noise.

Design and specifications are subject to change without notice.

OPTIONAL ACCESSORIES

Part No.	Description	Comment
KX-FA135	Film cartridge	1 cartridge & 1 film : 216 mm × 100 m (8 ½"×328') roll (Prints approx. 330 letter size pages)
KX-FA136	Replacement film	2 films : 216 mm × 100 m (8 ½"×328') rolls (Prints approx. 660 letter size pages total)

KX-FP270

CCITT NO. 1 TEST CHART (Actual size)



THE SLEREXE COMPANY LIMITED

SAPORS LANE - BOOLE - DORSET - BH 25 8 ER

TELEPHONE BOOLE (945 13) 51617 - TELEX 123456

Our Ref. 350/PJC/EAC

18th January, 1972.

Dr. P.N. Cundall,
Mining Surveys Ltd.,
Holroyd Road,
Reading,
Berks.

Dear Pete,

Permit me to introduce you to the facility of facsimile transmission.

In facsimile a photocell is caused to perform a raster scan over the subject copy. The variations of print density on the document cause the photocell to generate an analogous electrical video signal. This signal is used to modulate a carrier, which is transmitted to a remote destination over a radio or cable communications link.

At the remote terminal, demodulation reconstructs the video signal, which is used to modulate the density of print produced by a printing device. This device is scanning in a raster scan synchronised with that at the transmitting terminal. As a result, a facsimile copy of the subject document is produced.

Probably you have uses for this facility in your organisation.

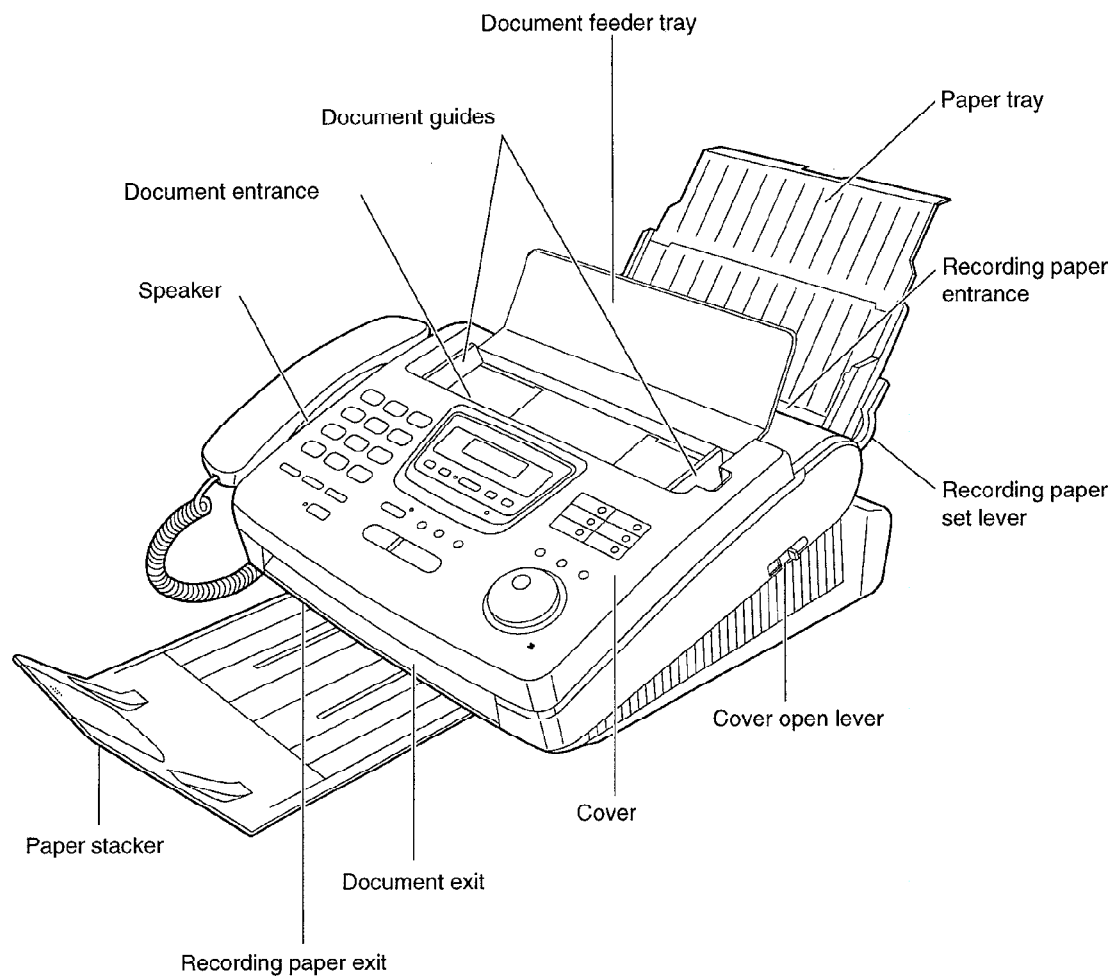
Yours sincerely,

Phil.

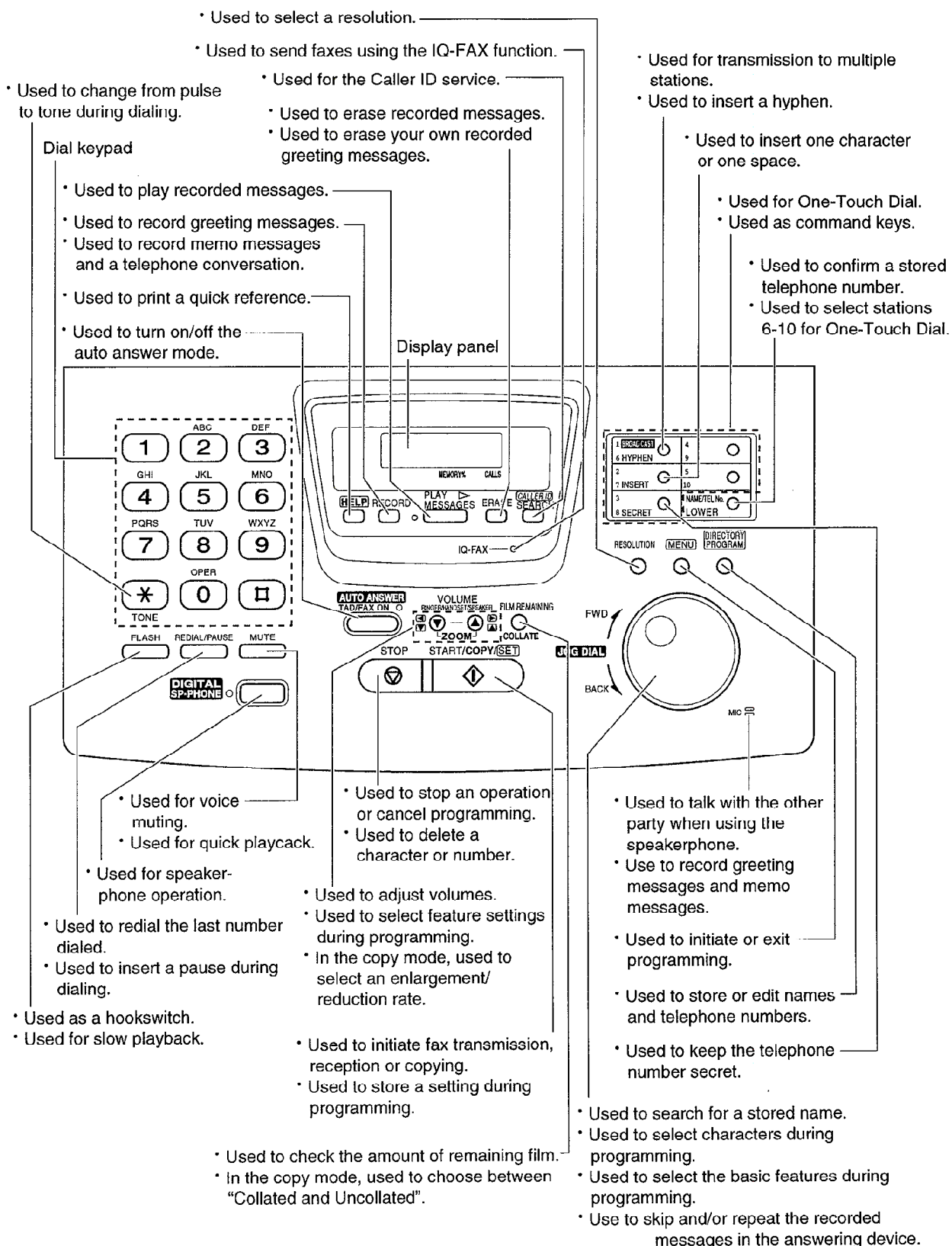
P.J. CROSS
Group Leader - Facsimile Research

LOCATION OF CONTROLS

1. OVERVIEW



2. CONTROL PANEL



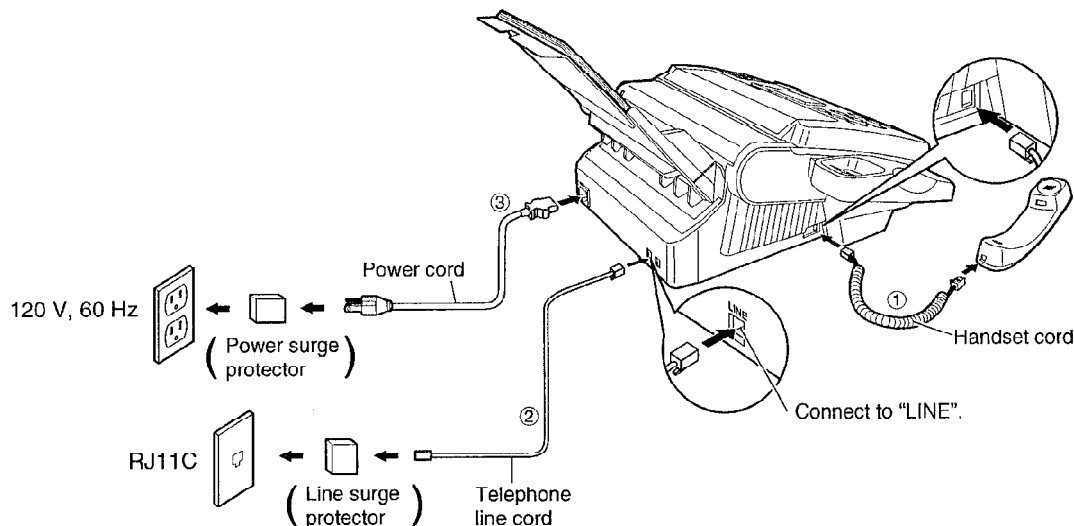
CONNECTIONS

- ① Connect the handset cord.
- ② Connect the telephone line cord.
- ③ Connect the power cord.

•When the power is turned on for the first time, the unit will print some basic information.

This connection is for the U.S.A. version only.

Refer to the simplified manual (cover) for other areas.



Note:

- The warranty does not cover damage due to power line surges or lightning.
- For additional equipment protection, we recommend the use of a surge protector. The following types are available; TELESPIKE BLOK MODEL TSB (TRIPPLE MFG. CO.), SPIKE BLOK MODEL SK6-0 (TRIPPLE MFG. CO.), SUPER MAX (PANAMAX) or MP1 (ITW LINX).
- When you operate this product, the power outlet should be near the product and easily accessible.
- If the following message is displayed when the unit is plugged in, the recording paper set lever is released.

Display: CHECK LEVER

Move the lever back.

Automatic dialing mode setting

- When the telephone line cord and the power cord are connected, the unit will automatically start to detect the dialing mode.

Display: CHECKING LINE

Wait until one of the following messages is displayed.

— If you line has touch tone service:

LINE IS TONE

— If you line has rotary pulse dial service:

LINE IS PLUSE

- If the power cord is disconnected or a power failure occurs, the unit will detect the dialing mode again when power is restored.
- You can change the dialing mode setting manually by user mode.
- If you connect the power cord before connecting the telephone line cord, the following messages will be shown alternately.

INSERT TEL LINE

NO TEL LINE

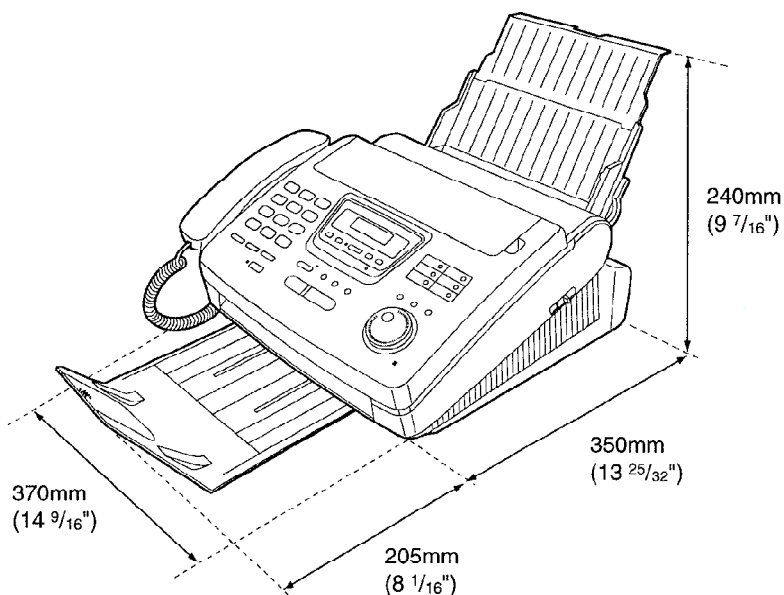
Connect the telephone line cord.

INSTALLATION

1. INSTALLATION SPACE

The space required to install the unit is shown below.

The dimensions given are necessary for the unit to operate efficiently.



NOTE

Avoid excessive heat or humidity.

Use the unit within the following ranges of temperature and humidity.

Ambient temperature: 5°C to 35°C

Relative humidity: 20% to 80% (without condensation)

Power cord length should be less than 5 meters (16.4 feet). Using a longer cord may reduce the voltage or cause malfunctions.

Avoid direct sunlight.

Do not install near devices which contain magnets or generate magnetic fields.

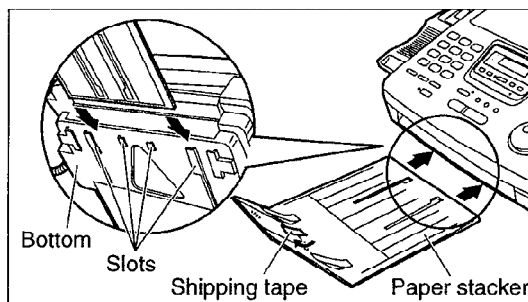
Do not subject the unit to strong physical shock or vibration.

Keep the unit clean. Dust accumulation can prevent the unit from functioning properly.

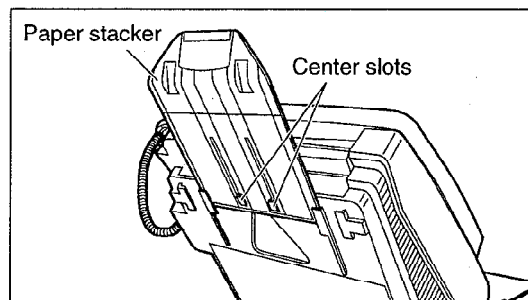
To protect the unit from damage, hold both sides when you move it.

2. INSTALLING THE PAPER STACKER

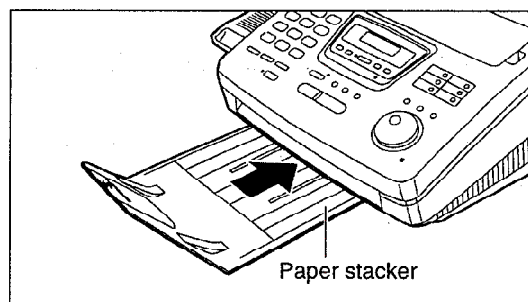
- (1) Remove the shipping tape from the paper stacker.
- (2) Lift the front of the unit and insert the paper stacker into the slots.



- (3) Confirm if the paper stacker is locked with the center slots.

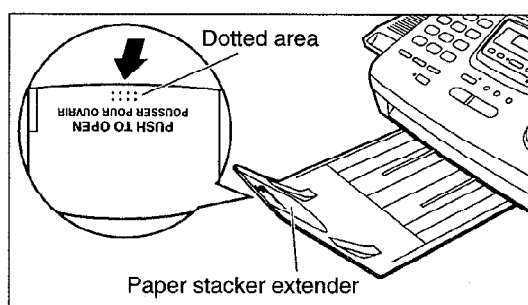


- (4) Slide the paper stacker until it stops.

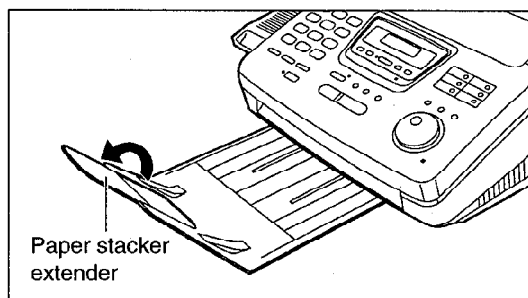


● Using legal size paper

- (1) Press the dotted area on the paper stacker extender.

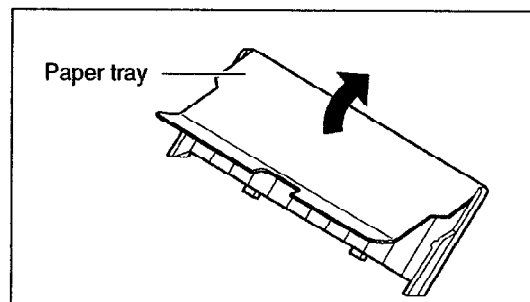


- (2) Open the paper stacker extender.



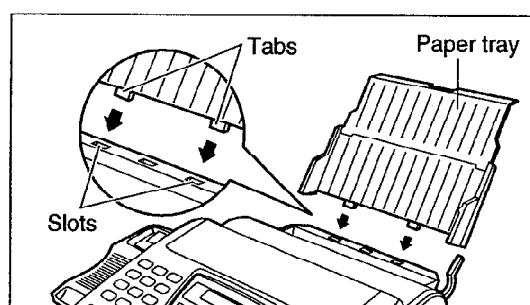
3. INSTALLING THE PAPER TRAY

- (1) Open the paper tray.



- (2) Insert the two tabs on the paper tray into the slots on the back of the unit.

- Do not place the unit in areas where the paper tray may be obstructed by a wall, etc.



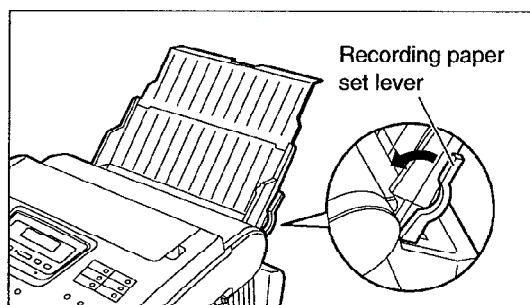
4. INSTALLING THE RECORDING PAPER

Letter or legal size recording paper can be loaded.

The paper tray can hold up to 150 sheets of 75 g/m² (20 lb.) paper. You may use 60 to 90 g/m² (16 to 24 lb.) paper.

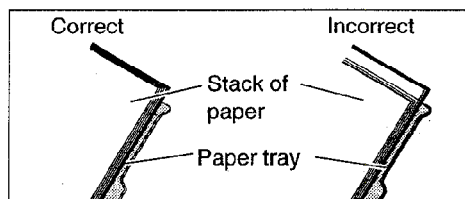
For best results, use inkjet paper like Hammermill® Jet Print. If you use other types of paper, the print quality may be affected.

- (1) Pull the recording paper set lever forward.



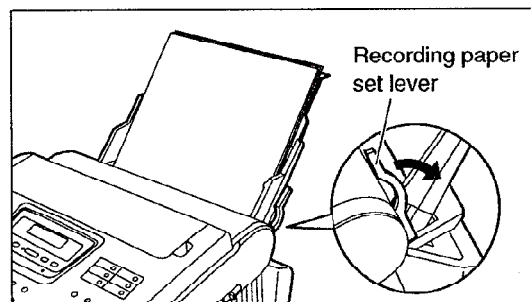
- (2) Fan the stack of paper to prevent a paper jam and insert the paper into the paper tray.

- The height of the stack of the paper should not exceed the upper limit on the paper tray, otherwise a paper jam or multi-feed may occur.
- The paper should not be over the tab.
- If the paper is not inserted correctly, readjust the paper or a paper jam may occur.



Trademark: Hammermill® is a registered trademark of INTERNATIONAL PAPER in the United States and/ or other countries.

(3) Move the recording paper set lever back.



Note:

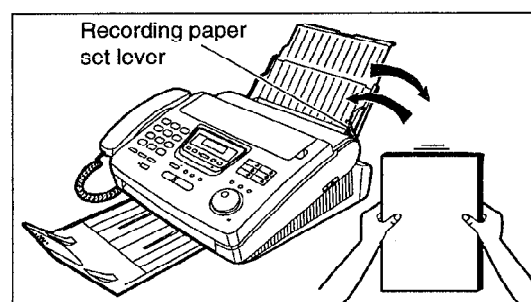
- Avoid paper with a cotton and/or fiber content that is over 20%, such as letterhead paper or those used for resumes.
- Do not use different types or thicknesses of paper in the paper tray at the same time. This may cause a paper jam.
- Avoid extremely smooth or shiny paper that is highly textured. Also avoid paper that is coated, damaged or wrinkled.
- Avoid double-sided printing.
- Do not use paper printed from this unit for double-sided printing with other copiers or printers, or a paper jam may occur.

• Adding paper to the paper tray

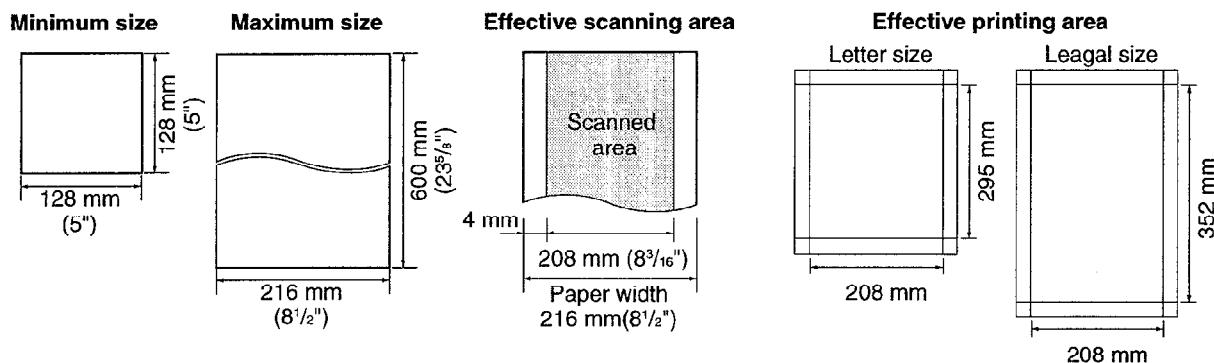
1. Pull the recording paper set lever forward.
 - The unit will beep and the following message is displayed.

Display: CHECK LEVER

2. Remove the installed paper.
3. Add paper to the removed paper and straighten it.
4. Fan the stack of paper and insert it into the paper tray.
5. Move the recording paper set lever back.



• Documents the unit can feed



Note:

- Remove clips, staples or other similar fastening objects.
- Check that ink, paste or correction fluid has dried.
- Do not send the following types of documents. Use copies for fax transmission.
 - Chemically treated paper such as carbon or carbonless duplication paper
 - Electrostatically charged paper
 - Heavily curled, creased or torn paper
 - Paper with a coated surface
 - Paper with a faint image
 - Paper with printing on the opposite side that can be seen through the front (e.g. newspaper)
- Only 15 sheets can be accepted at one time (60 to 75 g/m²). For a single sheet of 45 to 90 g/m², only one sheet can be accepted at one time.

Document weight

Single sheet:

45 to 90 g/m² (12 to 24 lb.)

Multiple sheets:

60 to 75 g/m² (16 to 20 lb.)

Recording paper weight

60 to 90 g/m² (16 to 24 lb.)

75 g/m² (20 lb.)... up to 150 sheets

5. SETTING YOUR LOGO

The logo can be a company, division or name.

- (1) Press **MENU**.

Display: SYSTEM SET UP

- (2) Press **#**, then **0 2**.

YOUR LOGO

- (3) Press **START/COPY/SET**.

LOGO=

- (4) Enter your logo, up to 30 characters, by using the dial keypad or **JOG DIAL**.

For example, when entering "Bill" as your logo:

1. Press **2** twice.

LOGO=B

2. Press **4** six times.

Cursor

LOGO=Bi

3. Press **5** six times.

LOGO=Bill

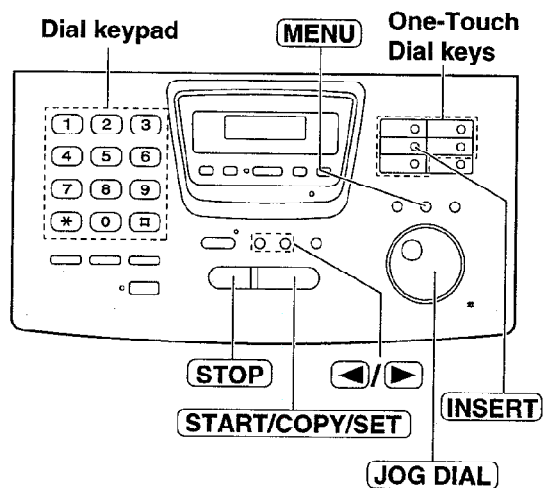
4. Press **▶** to move the cursor to the next space and press **5** six times.

LOGO=Bill

- (5) Press **START/COPY/SET**.

SYSTEM SET UP

- (6) Press **MENU**.



To correct a mistake

- Use **◀** or **▶** to move the cursor to the incorrect character, then make the correction.

To delete a character

- Move the cursor to the character you want to delete and press **STOP**.

To insert a character

- Use **◀** or **▶** to move the cursor to the position to the right of where you want to insert the character.
- Press **INSERT** (One-Touch Dial key 2) to insert a space and enter the character.

• To select characters with the dial keypad

Pressing the dial keys will select a character as shown below.

Keys		Characters
Dial Keys	①	1 [] { } + - / = , . _ ' : ; ?
	②	A B C a b c 2
	③	D E F d e f 3
	④	G H I g h i 4
	⑤	J K L j k l 5
	⑥	M N O m n o 6
	⑦	P Q R S p q r s 7
	⑧	V U T t u v 8
	⑨	W X Y Z w x y z 9
	⑩	0 () < > ! " # \$ % & ¥ * 1 @ ' →
One-Touch Dial keys		HYPHEN key (Used to insert a hyphen.)
		INSERT key (Used to insert one character or one space.)
Arrow keys		◀ key (Used to move the cursor to the left.)
		▶ key (Used to move the cursor to the right.) To enter another character using the same number key, move the cursor to the next space.

Note:

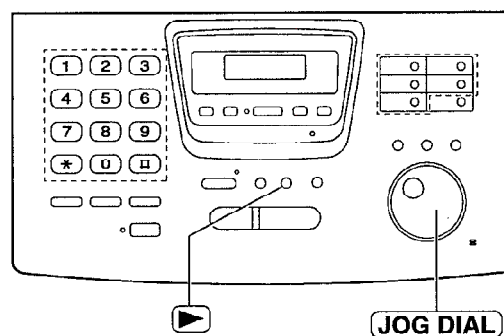
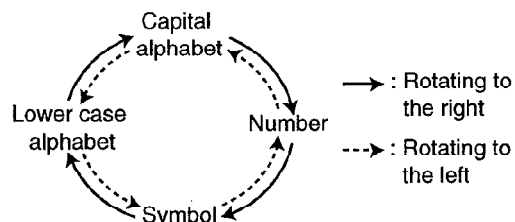
A hyphen entered in a telephone number is counted as two digits.

• To select characters using the JOG DIAL

Instead of pressing the dial keys, you can select characters using the JOG DIAL.

1. Rotate **JOG DIAL** until the desired character is displayed.
2. Press to move the cursor to the next space.
•The character displayed in step 1 is inserted.
3. Return to step 1 to enter the next character.

Displayed order of characters



6. REPLACING THE FILM OR FILM CARTRIDGE

When the unit detects the end of the film, the following message will be displayed.

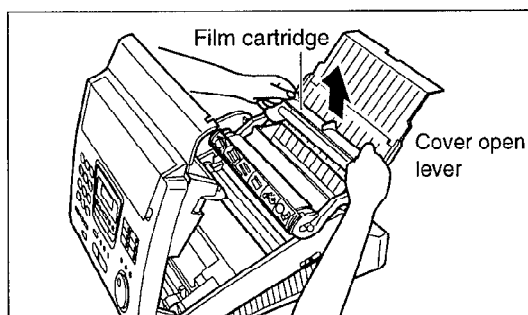
FILM NEAR EMPTY

The remaining film prints about 15 pages of letter size documents.
Prepare a new film or film cartridge.

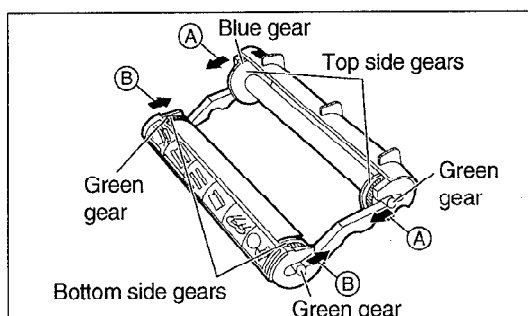
FILM EMPTY

The film is empty. Install a new film or film cartridge.

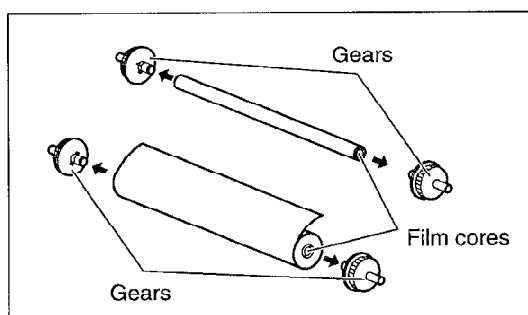
• For film and film cartridge information, refer to page 9.



- (1) Slide the cover open lever forward.
- (2) The cover is under tension to improve print quality. Pull up hard enough to open.
- (3) Remove the film cartridge.
 - If you have purchased a film cartridge (Part no. KX-FA135) for replacement, skip to step 10.
 - To replace only the film (Part no. KX-FA136), go to step 4.



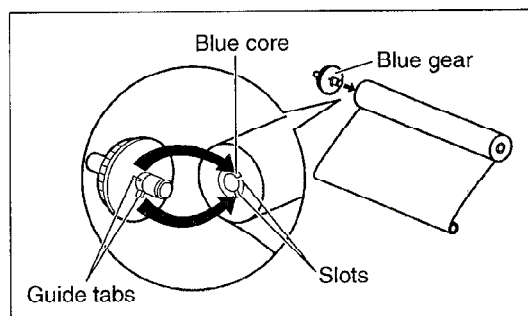
- (4) Unlock the four gears by (A) pulling the top side gears (blue and green gears) forward and (B) pushing back the bottom side gears (green gears). Remove the used film.



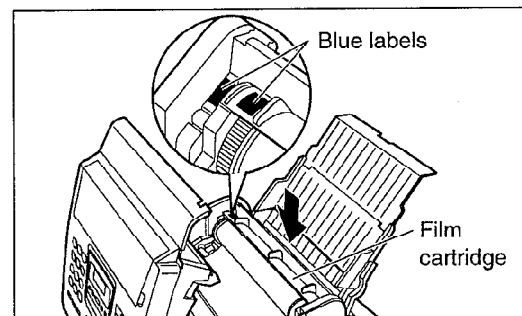
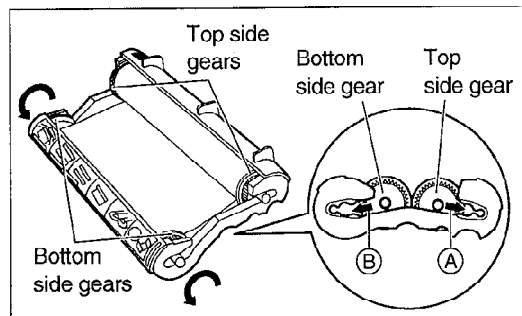
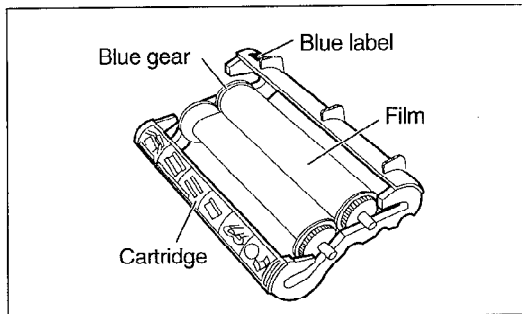
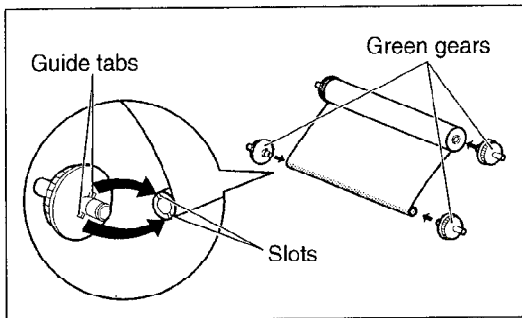
- (5) Remove the four gears from the used film cores.

Caution:

- The film is not reusable. You can order a new film for replacement through your nearest Panasonic dealer.



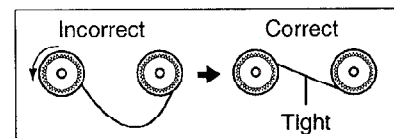
- (6) Insert the blue gear into the blue core of the new film.



(7) Insert the three green gears into the remaining cores of the new film.

(8) Insert the film into the cartridge so that the blue gear matches the blue label on the cartridge.
•The shiny side should be facing up.

(9) Lock the four gears of the film by (A) pushing back the top side gears and (B) pulling the bottom side gears forward until they click into place.
• If the film is slack, tighten it by winding the bottom side gears.



(10) Insert the film cartridge by matching the blue label on the cartridge with the one on the unit.

(11) Close the cover securely by pushing down on both corners.
• The unit will check if the film is installed correctly. The following message will be displayed.

Display: PLEASE WAIT

• If the following message is displayed, the film is not inserted correctly in the cartridge.

CHECK FILM

Reinsert it correctly.

•How much film you have left

To check the amount of remaining film, press **FILM REMAINING** while the unit is idle. The display indicates the approximate amount of remaining film.

Display: FILM E _ _ _ _ F
↓
FILM E _ _ _ _ F

When the film indicator points to this position, the remaining film will print up to 25 pages of letter size documents. Prepare a new film or film cartridge for replacement.

MAINTENANCE ITEMS AND COMPONENT LOCATIONS

1. OUTLINE

MAINTENANCE AND REPAIRS ARE PERFORMED USING THE FOLLOWING STEPS.

1) Periodic maintenance

Inspect the equipment periodically and if necessary, clean any contaminated parts.

2) Check for breakdowns

Look for problems and consider how they arose.

If the equipment can be still used, perform copying, self testing or communication testing.

3) Check equipment

Perform copying, self testing and communication testing to determine if the problem originates from the transmitter, receiver or the telephone line.

4) Determine causes

Determine the causes of the equipment problem by troubleshooting.

5) Equipment repairs

Repair or replace the defective parts and take appropriate measures at this stage to ensure that the problem will not recur.

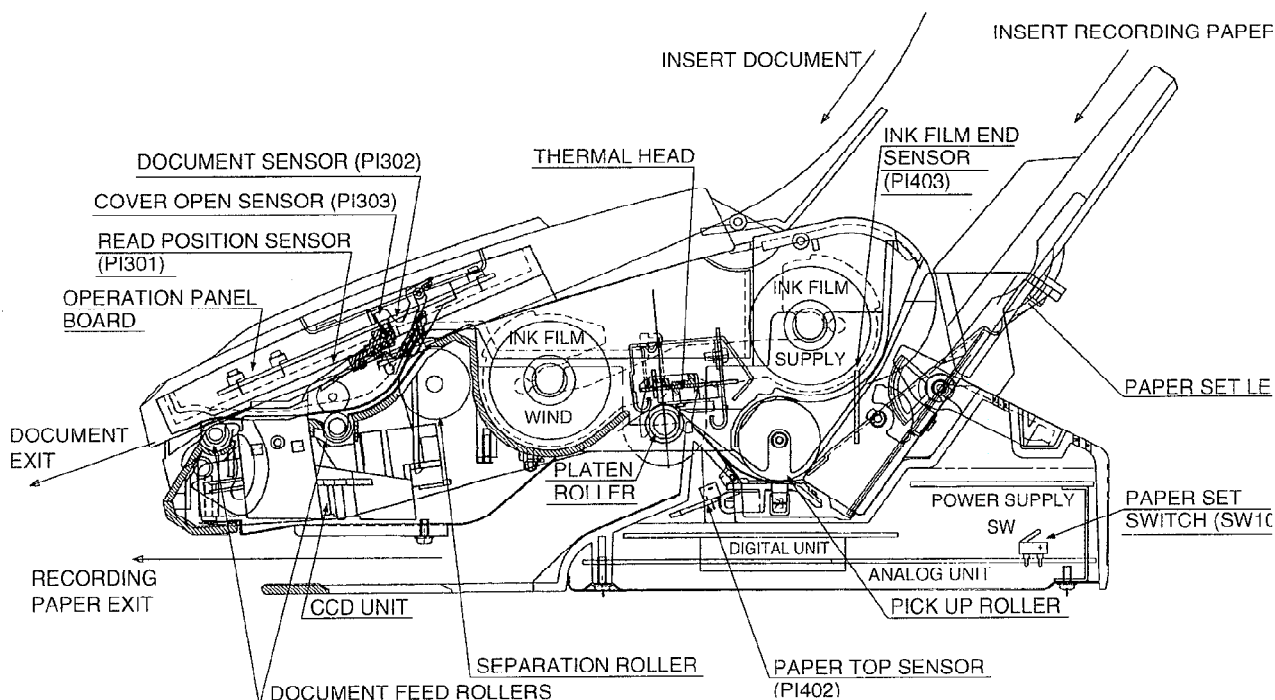
6) Confirm normal operation of the equipment

After completing the repairs, conduct copying, self testing and communication testing to confirm that the equipment operates normally.

7) Record keeping

Make a record of the measures taken to rectify the problem for future reference.

2. MAINTENANCE CHECK ITEMS/COMPONENT LOCATIONS



2.1 MAINTENANCE LIST

NO.	OPERATION	CHECK	REMARKS
1	Document Path	Remove any foreign matter such as paper.	_____
2	Rollers	If the roller is dirty, clean it with a damp cloth then dry thoroughly.	See page 24.
3	Platen Roller	If the platen is dirty, clean it with a damp cloth then dry thoroughly. Remove the paper and film cartridge before cleaning.	_____
4	Thermal Head	If the thermal head is dirty, clean the printing surface with a cloth moistened with denatured alcohol (alcohol without water), then dry thoroughly.	See pages 24 and 123.
5	Target Glass, White Plate	If the target glass and white plate are dirty, clean the glass with a soft dry cloth.	See page 24.
6	Sensors	Document sensor (PI302), Read position sensor (PI301), Hook switch (SW401), Paper top sensor (PI402), Film end sensor (PI403), Cover open sensor (PI303) and Paper set switch (SW101). Confirm the operation of the sensors.	See pages 22 or 87, and 157.
7	Mirrors and Lens	If the mirrors and lens are dirty, clean them with a soft dry cloth.	_____
8	Abnormal, wear and tear or loose parts	Replace the part. Check if the screws are tight on all parts.	_____

2.2 MAINTENANCE CYCLE

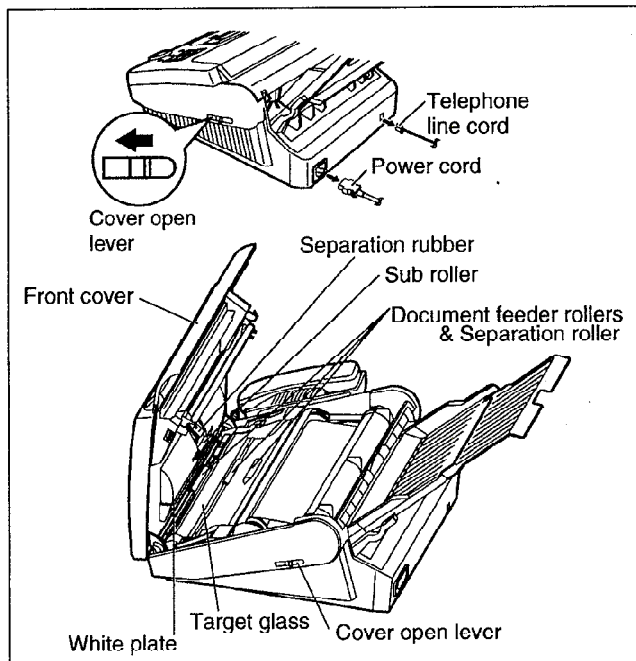
No.	Item	Cleaning		Replacement	
		Cycle	Procedure	Cycle	Procedure
1	Separation Roller (Ref. No. 142)	3 months	See p. 24.	7 years (100,000 documents)	See p. 129.
2	Separation Rubber (Ref. No. 59)	3 months	See p. 24.	7 years (100,000 documents)	See p. 124.
3	Feed Rollers (Ref. No. 135,139)	3 months	See p. 24.	7 years (100,000 documents)	See p. 130.
4	Target Glass, White plate (Ref. No. 201,56)	3 months	See p. 24.	7 years (100,000 documents)	See p. 198, 202
5	Thermal Head (Ref. No. 69)	3 months	See p. 24.	7 years (100,000 documents)	See p. 123.
6	Platen Roller (Ref. No. 133)	3 months	See p. 130.	7 years (100,000 documents)	See p. 130.

These values are only standard ones and may vary depending on usage conditions.

3. MAINTENANCE

3.1 CLEANING THE DOCUMENT FEEDER UNIT

If misfeeding occurs frequently or if dirty patterns or black bands appear on a copied or transmitted document, clean the document feeder rollers, sub roller, separation rubber flap, white plate and target glass.

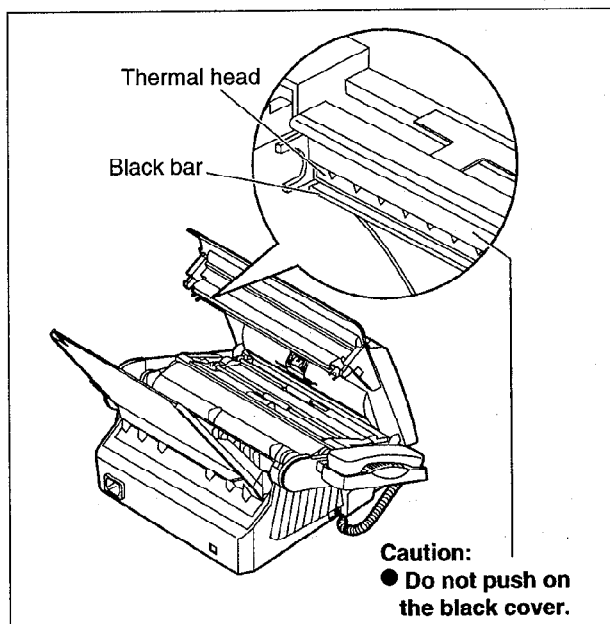


- (1) Disconnect the power cord and telephone line cord.
- (2) Slide the cover open lever forward to unlock the cover.
- (3) The cover is under tension to improve print quality. Pull up hard enough to open.
- (4) Clean the document feeder rollers, sub roller, separation rubber and separation roller with a cloth moistened with isopropyl rubbing alcohol, and let all parts dry thoroughly.
- (5) Clean the white plate and the target glass with a soft dry cloth.
- (6) Close the cover securely by pushing down on both corners.
- (7) Connect the power cord and telephone line cord.

Caution: Do not use paper products, such as paper towels or tissues, to clean the inside of the unit.

3.2 CLEANING THE THERMAL HEAD AND BLACK BAR

If dirty patterns or black or white bands appear on a copied or received document, clean the thermal head and black bar.



- (1) Disconnect the power cord and telephone line cord.
- (2) Slide the cover open lever forward.
- (3) The cover is under tension to improve print quality. Pull up hard enough to open.
- (4) Clean the thermal head and black bar with a cloth moistened with isopropyl rubbing alcohol, and let dry thoroughly.
- (5) Close the cover securely by pushing down on both corners.
- (6) Connect the power cord and telephone line cord.

Caution: To prevent a malfunction due to static electricity, do not use a dry cloth and do not touch the thermal head directly with your fingers.

3.3 CLEANING THE PICK UP ROLLERRefer to page 129.

TROUBLESHOOTING GUIDE

	Page
1. Troubleshooting Summary	26
1.1 Troubleshooting	26
1.2 Precautions	26
1.3 When you don't know how to operate the unit, use the Help function	26
2. User Recoverable Errors	27, 28
3. Troubleshooting Details	29~91
3.1 Outline	29
3.2 Starting Troubleshooting	29
3.3 Troubleshooting Items Table	30
4. Programming and Lists	92~104
5. Test Functions	105~110

1. TROUBLESHOOTING SUMMARY

1. 1 TROUBLESHOOTING

After confirming the problem by asking the user, troubleshoot according to the instructions and observe the following precautions.

1. 2 PRECAUTIONS

- 1) If there is a problem with the print quality or the paper feed, first check if the installation space and the print paper meets the specifications, the paper selection lever/paper thickness lever is set correctly, and the paper is set correctly without any slack.
- 2) Before troubleshooting, first check that the connectors and cables are connected correctly (not loose).
If the problem occurs randomly, check it very carefully.
- 3) When connecting the AC power cord with the unit and checking the operation, exercise utmost care when handling electric parts in order to avoid electric shocks and short-circuits.
- 4) After troubleshooting, double check that you have not forgotten any connectors, left any loose screws, etc.
- 5) Always test to verify that the unit is working normally.

1. 3 WHEN YOU DON'T KNOW HOW TO OPERATE THE UNIT, USE THE *HELP* FUNCTION

- How to use: 1. Press **HELP**.
2. Press **▲** or **▼** until the desired item is displayed.
3. Press **START/COPY/SET**.

2. USER RECOVERABLE ERRORS

If the unit detects a problem, one or more of the following messages will appear on the display.

DISPLAY MESSAGE	CAUSE AND REMEDY
CALL SERVICE	<ul style="list-style-type: none"> There is something wrong with the unit. Contact our service personnel. [This error is displayed when the thermal head does not warm up. Check the thermistor on the thermal head and connector lead. (for technicians)]
CHECK COVER	<ul style="list-style-type: none"> The cover is open. Close it.
CHECK DOCUMENT	<ul style="list-style-type: none"> The document is not fed into the unit properly. Reinsert the document. If misfeeding occurs frequently, clean the document feeder rollers and try again. If the problem remains, adjust the feeder pressure. (Refer to page 113.)
CHECK FILM	<ul style="list-style-type: none"> The film cartridge is not inserted properly. Reinsert it correctly.
CHECK LEVER	<ul style="list-style-type: none"> The recording paper set lever is released. Push it back to set the lever.
CHECK MEMORY	<ul style="list-style-type: none"> Memory (telephone numbers, parameters, etc.) has been erased. Re-program. [The backup battery on the top of the digital board may be low or dead, so check it.]
CHECK PAPER	<ul style="list-style-type: none"> The recording paper is not installed or the unit ran out of paper. Install paper. The recording paper is not fed into the unit properly or has jammed near the recording paper entrance. Clear the jammed paper. Do not install folded or heavily curled paper in the paper tray.
FAX IN MEMORY	<ul style="list-style-type: none"> The unit has (a) document(s) in memory. See the other message's instructions to print out the document(s).
FAX MEMORY FULL	<ul style="list-style-type: none"> Memory is full of received documents due to lack of recording paper or a recording paper jam, etc. Install paper or clear the jammed paper. When performing memory transmission, the document being stored exceeds the memory capacity of the unit. Transmit the entire document by using manual or automatic transmission.
FILM EMPTY	<ul style="list-style-type: none"> The film is empty. Replace the film or film cartridge with a new one. The film is slack. Tighten it and install again.
FILM NEAR EMPTY	<ul style="list-style-type: none"> The remaining film can print about 15 pages of letter size documents. Prepare a new film or film cartridge.
FREE FILM EMPTY	<ul style="list-style-type: none"> The free starter film is empty. Replace the film or film cartridge with a new one.
JOG-DIAL FULL	<ul style="list-style-type: none"> There is no space to store new stations in the JOG DIAL directory. Edit or erase unnecessary stations.
LOADING ERROR	<ul style="list-style-type: none"> A loading error occurred while receiving IQ-data from <i>faxSav</i>®. This service is only available in the United States. [Refer to page 8 for details on the <i>faxSav</i>® service.]
MESSAGE FULL	<ul style="list-style-type: none"> There is no room left in memory to record a voice message. Erase some of all of the messages.
NO FAX REPLY	<ul style="list-style-type: none"> The other party's fax machine is busy or ran out of recording paper. Try again.
PAPER JAMMED	<ul style="list-style-type: none"> A recording paper jam occurred under the film cartridge. Clear the jammed paper. [If the printout jams, please refer to Fig. a on the next page.]

Trademark

faxSav is a registered trademark of FaxSav Incorporated.

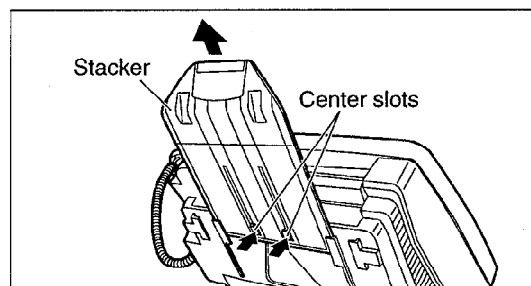
KX-FP270

DISPLAY MESSAGE	CAUSE AND REMEDY
PLEASE WAIT	<ul style="list-style-type: none">• The unit is checking if the film is set correctly. Wait for a while.
REDIAL TIME OUT	<ul style="list-style-type: none">• The other party's fax machine is busy or ran out of recording paper. Try again.
REMOVE DOCUMENT	<ul style="list-style-type: none">• The document is jammed. Remove the jammed document.• Attempted to transmit a document longer than 600 mm (23⁵/₈). Press the STOP button to remove the document. [Alternately, turn off service code #559 to enable sending of documents longer than 600 mm.]
TRANSMIT ERROR	<ul style="list-style-type: none">• A transmission error occurred. Try again.
UNIT OVERHEATED	<ul style="list-style-type: none">• The unit is too hot. Let the unit cool down. [If many copies are nearly all black, this message will be displayed. When this occurs, open the front cover and let the unit cool down.]
NO TEL LINE	<ul style="list-style-type: none">• Refer to page 13.

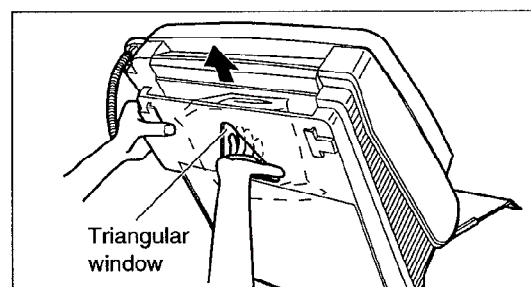
※The explanations given in the [] are for servicemen only.

Remove the jammed paper as follows.

- ① First, lift the front of the unit. Pull the stacker forward until it stops, then press the center slots to unlock and remove the stacker.



- ② Tilt the unit up and push the jammed recording paper out through the triangular window on the bottom of the unit.



- ③ Remove the jammed recording paper from the recording paper exit.

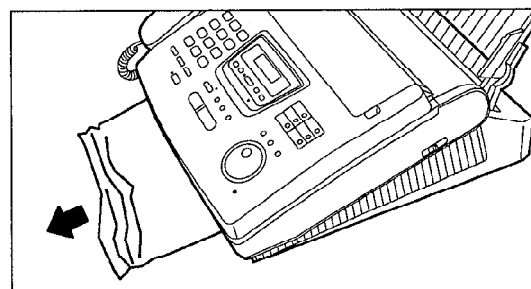


Fig. a

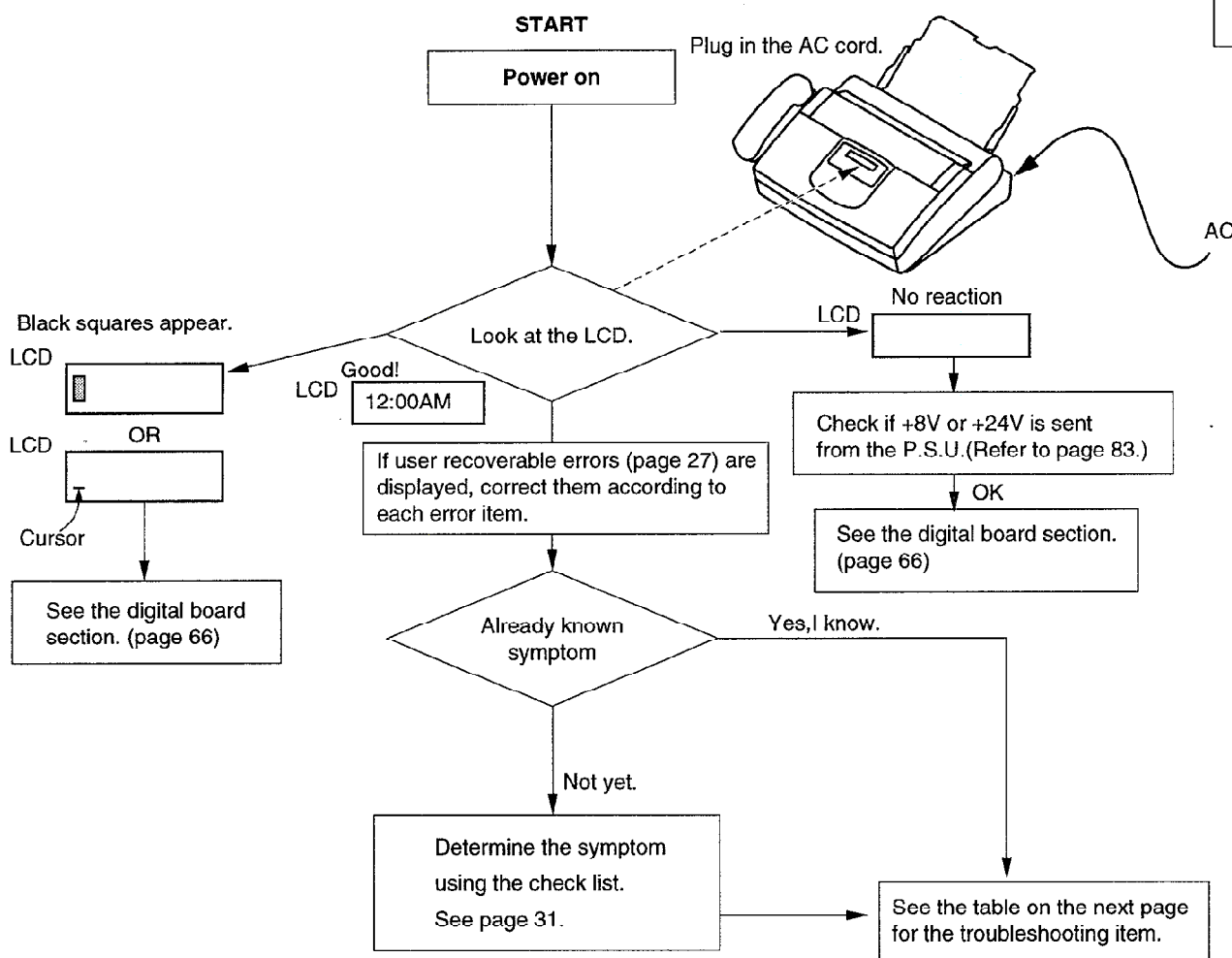
3. TROUBLESHOOTING DETAILS

3.1 OUTLINE

Troubleshooting is for recovering quality and reliability by determining the broken component and replacing, adjusting or cleaning it as required. First, determine the problem then decide the troubleshooting method. If you have difficulty finding the broken part, determine which board is broken. (For example: the Digital PCB, Analog PCB, etc.) The claim tag from a customer or dealer may use different expressions for the same problem, as they are not a technician or engineer. Using your experience, test the problem area corresponding to the claim. Also, returns from a customer or dealer often have a claim tag. For these cases as well, you need to determine the problem. Test the unit using the simple check list on page 31. Difficult problems may be hard to determine, so repeated testing is necessary.

3.2 STARTING TROUBLESHOOTING

Determine the symptom and the troubleshooting method.



3.3 TROUBLESHOOTING ITEMS TABLE

ITEM	SYMPTOM	SEE THIS PAGE.
ADF (Auto Document Feeder)	The document does not feed.	32
	Document jam	33
	Multiple feed	34
	Skew	35
Recording paper feed	The recording paper does not feed.	36
	Paper jam	37
	Multiple feed and skew	37
Printing	The sent fax data is skewed.	38
	The received fax data is skewed.	38
	The received or copied data is expanded.	38
	A blank page is copied.	39
	A blank page is received.	41
	Black or white vertical line	41
	Black or white lateral line	42
Communication FAX, TEL (analog board)	An abnormal image is printed.	43
	Cannot communicate by fax.	44
	An error code is displayed.	44
	Cannot talk.	78
	The DTMF tone doesn't work.	78
Operation panel	The handset/monitor doesn't work, etc.	78
	Keys are not accepted.	86
Sensor	If the electric circuit is the cause, the error message corresponding to the sensor will be displayed.	87

3.3.1 Simple Check List

SERIAL NO.

DATE

FUNCTION		JUDGEMENT	REFERENCE
FAX operaton	Transmission	OK / NG	
	Receiving	OK / NG	
Copy operation		OK / NG	
Telephone operation	Handset transceiver/ receiver	OK / NG	
	SP-PHONE sound	OK / NG	
	Ringer sound	OK / NG	
	Dial operation	OK / NG	
	Volume operation	OK / NG	
	VOX detection	OK / NG	Service code 815*
Operation panel	Key check	OK / NG	Service code 561*
	LED check	OK / NG	Service code 557*
	LCD check	OK / NG	Service code 558*
Sensor	Sensor check	OK / NG	Service code 815*
Clock	Sensor check	OK / NG	Is the time kept correctly? Check with another clock.
Digital Speaker phone		OK / NG	
Digital TAM	Greeting Rec/Play	OK / NG	
	Incoming message Rec/Play	OK / NG	
	Memo Rec/Play	OK / NG	
Voice prompt		OK / NG	SERVICE CODE 784 Check whether voice prompt is play or not.

TROUBLESHOOTING GUIDE

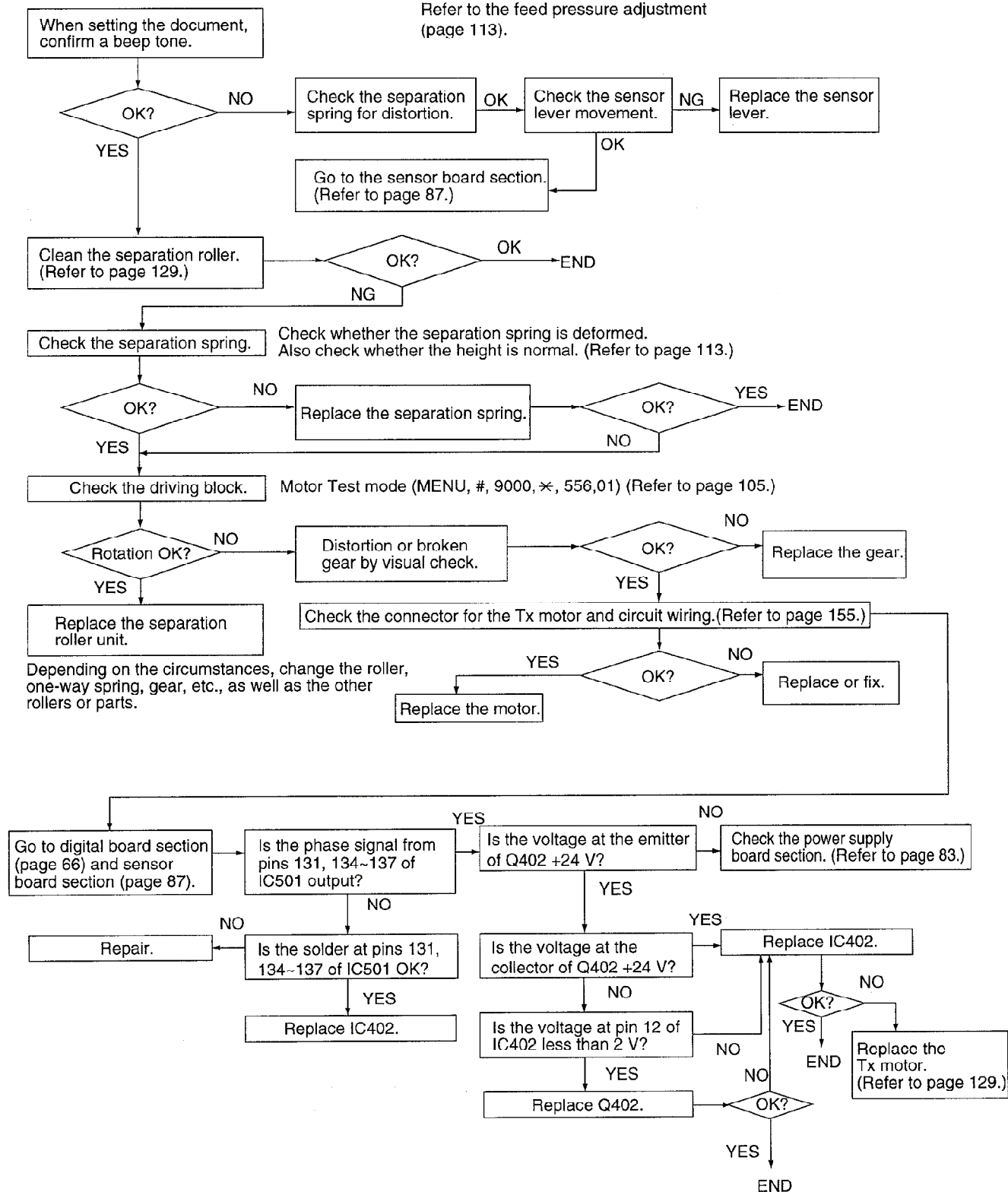
*Check according to the service code referring
to the Test function on page 105.

KX-FP270

3.3.2 ADF (Auto document feed) section

(1) No document feed

※ When using thin paper etc.,
sometimes the document will not feed.
Refer to the feed pressure adjustment
(page 113).



(2) Document JAM

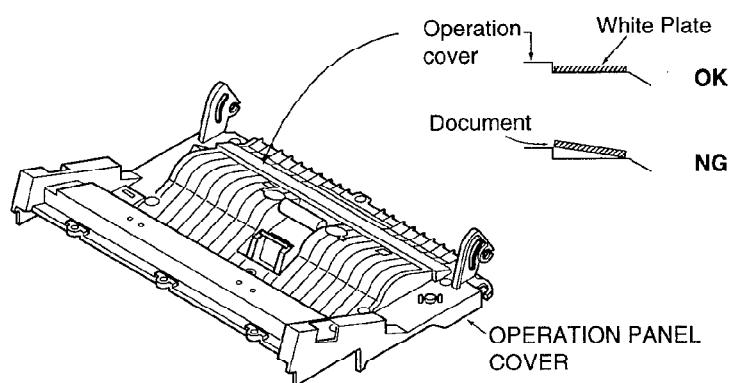
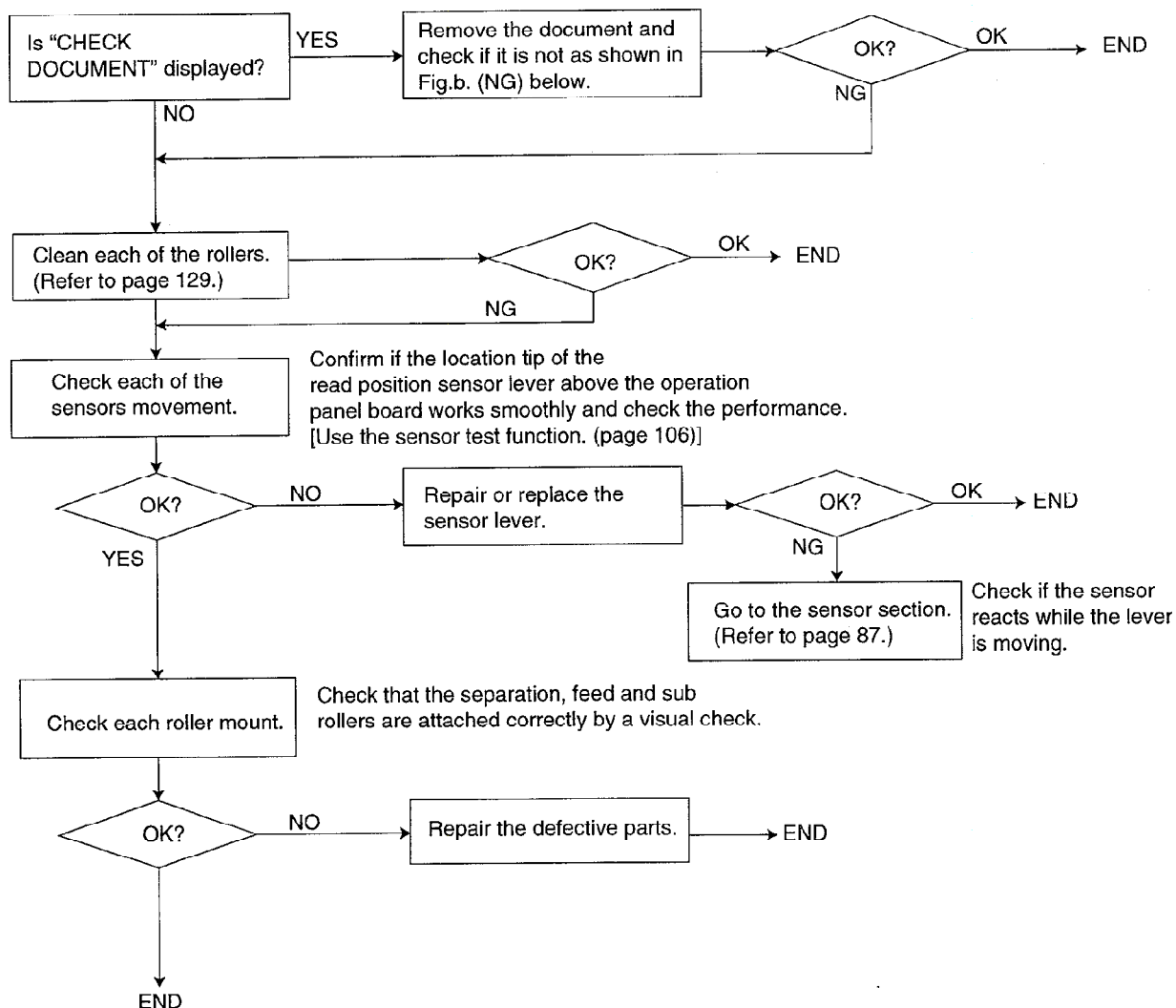


Fig. b

(3) Multiple feed

- When using thick paper etc., sometimes the document will not feed.
Refer to the feed pressure adjustment (page 113).

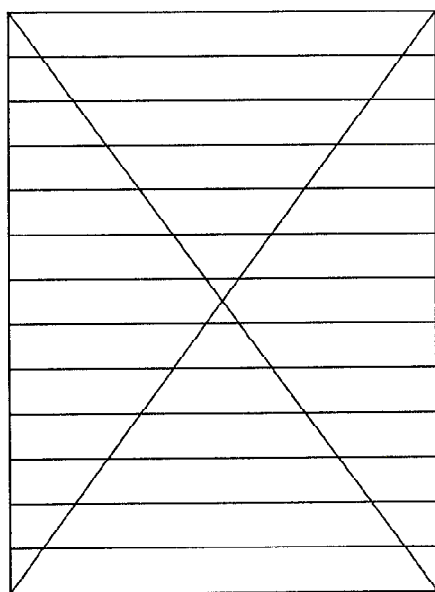
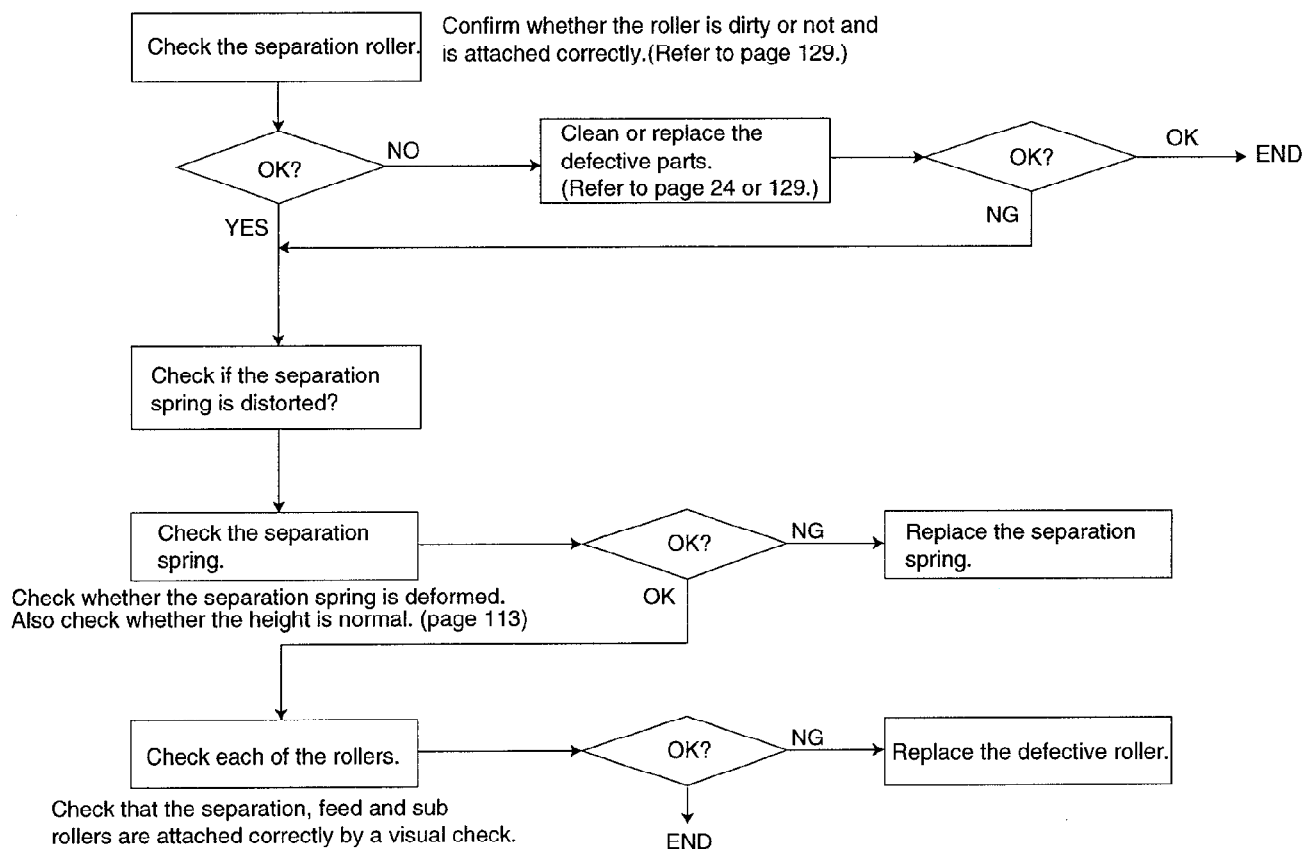
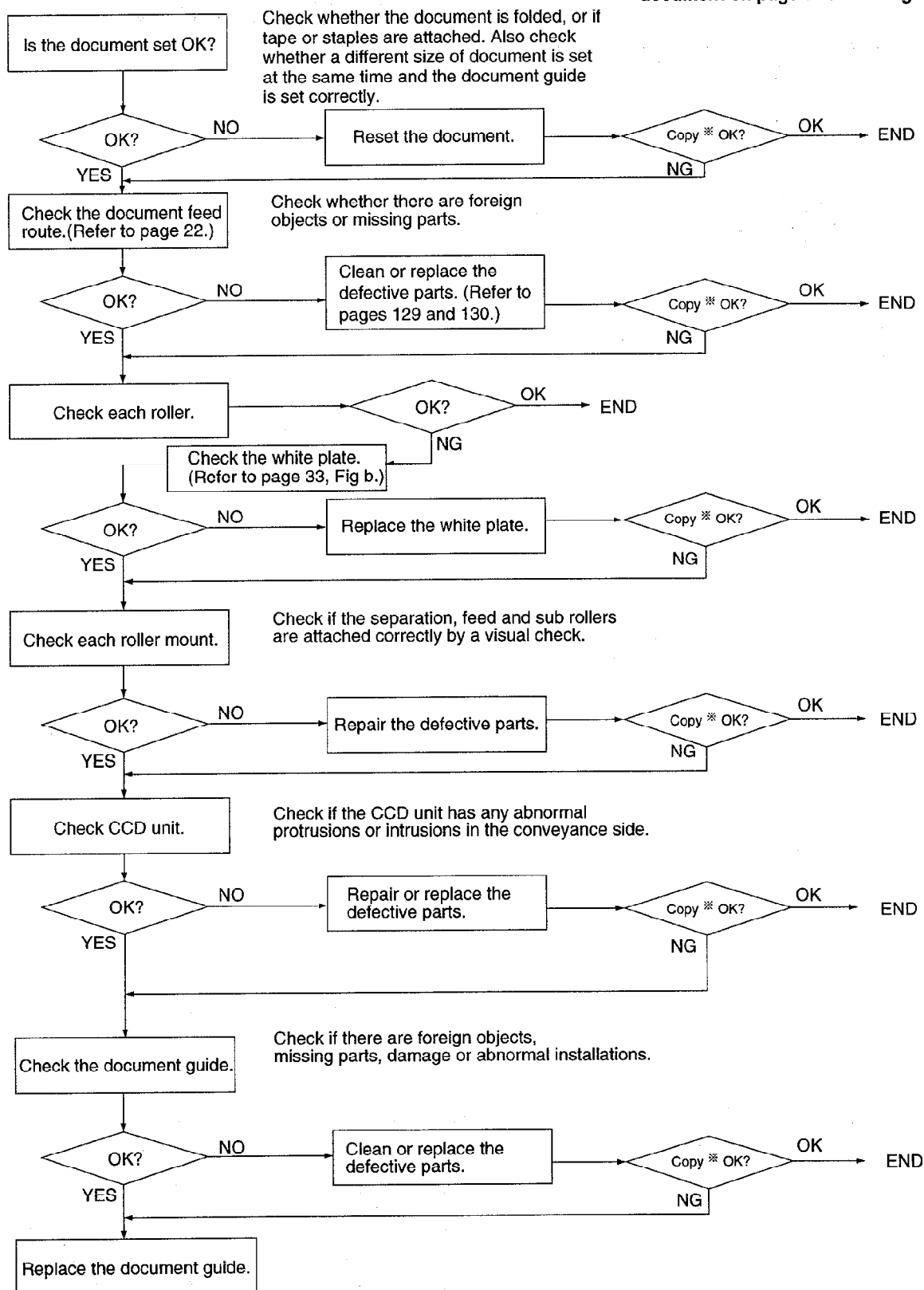


Fig. A

※ When confirming if the characters are extended or distorted on, if the feed problem is occurred, use this kind of test chart.

(4) Skew

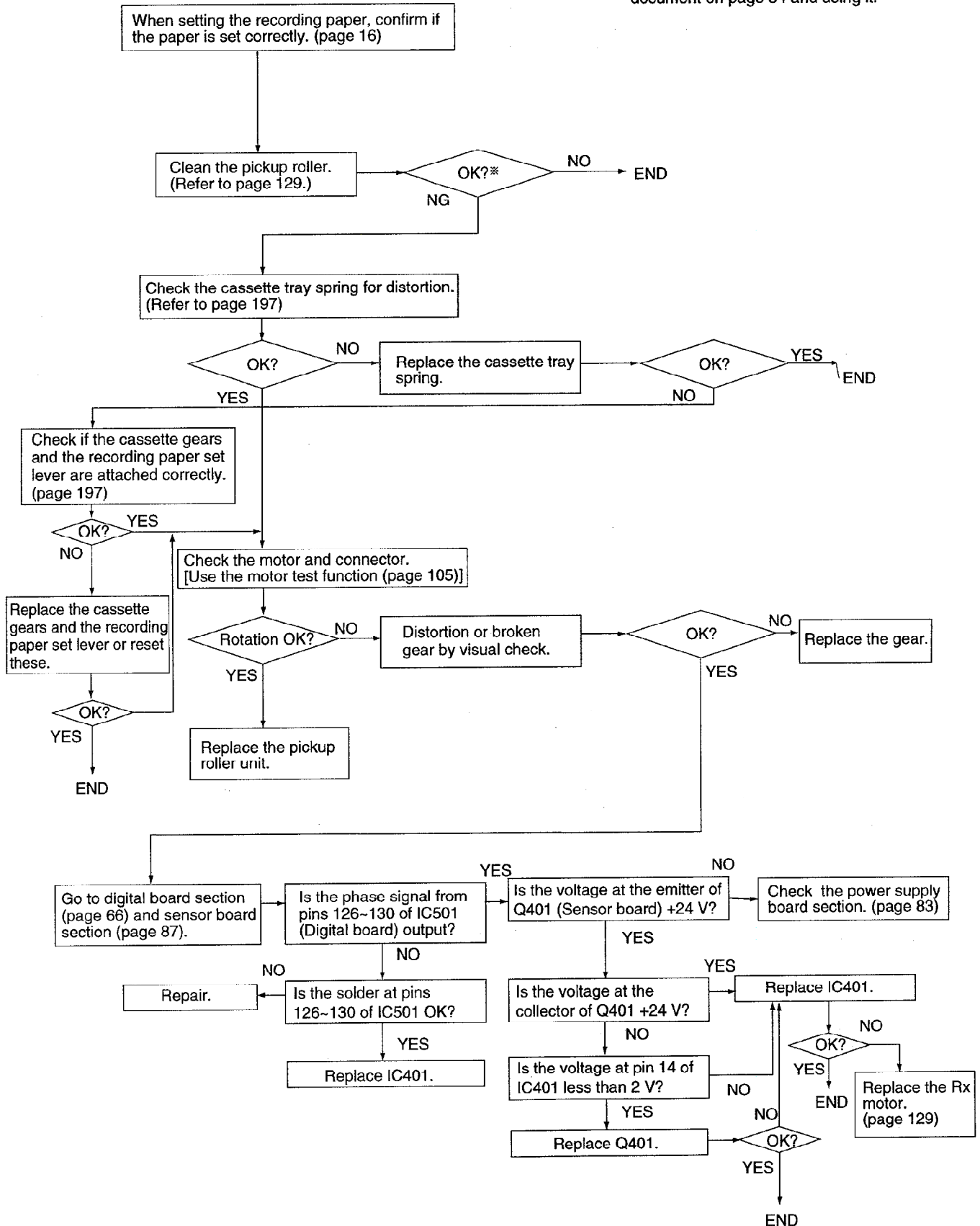
※ We recommend making a copy of the Fig. A document on page 34 and using it.

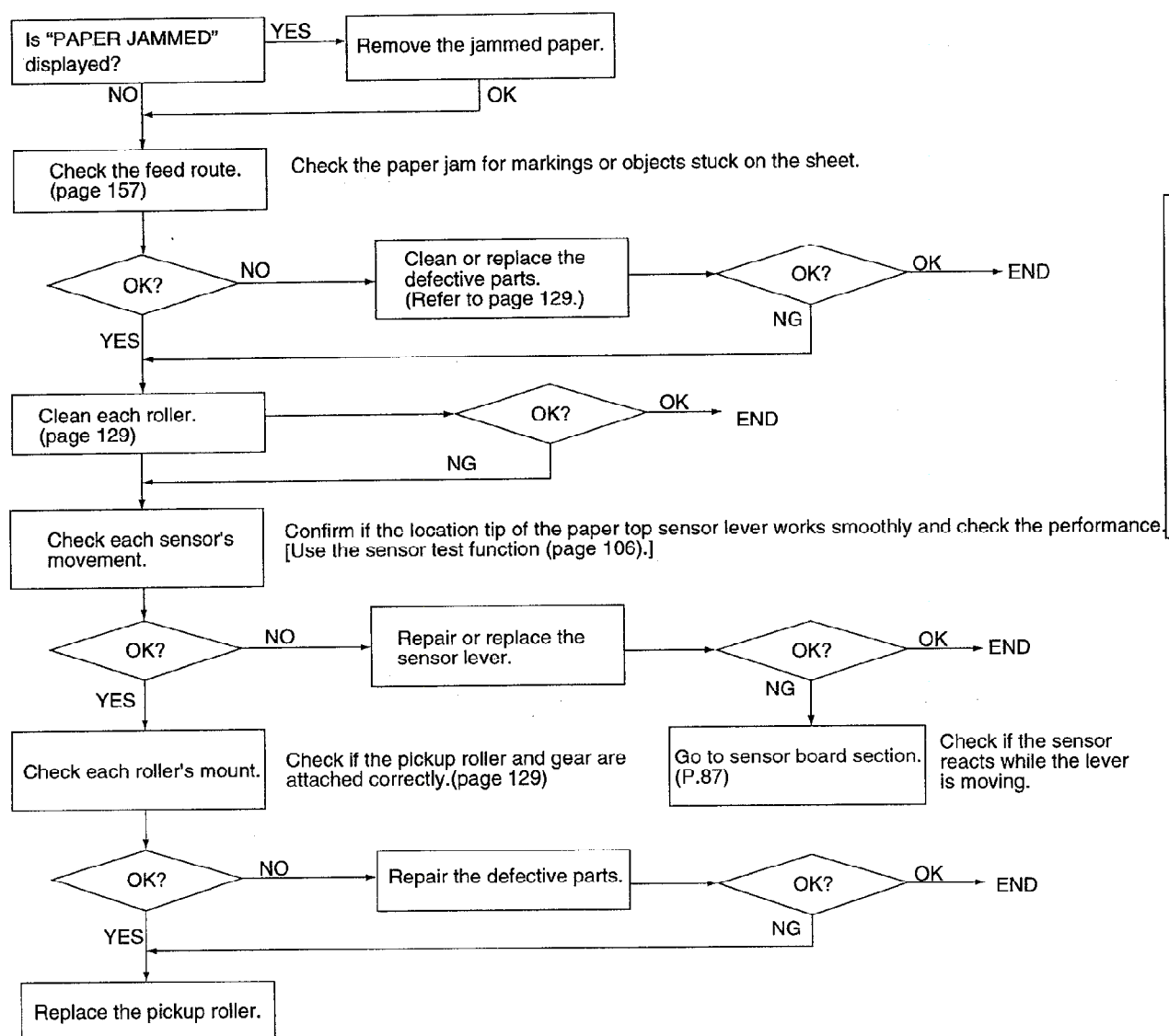
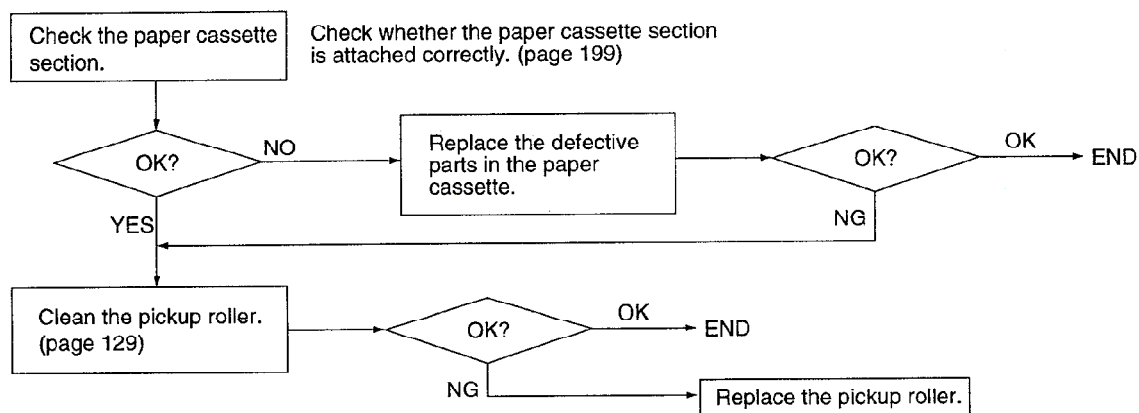


KX-FP270

(5) The recording paper does not feed.

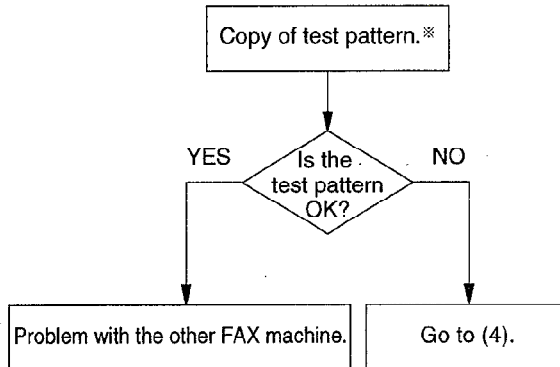
※ We recommend making a copy of the Fig. A document on page 34 and using it.



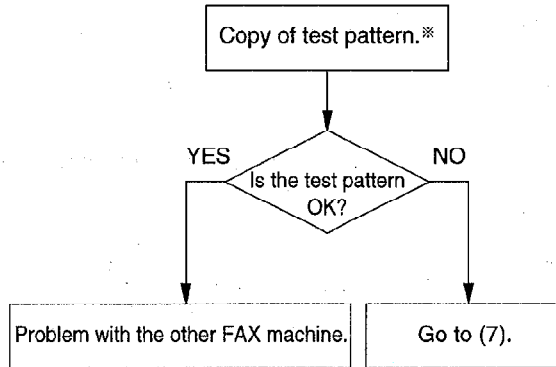
(6) Paper JAM**(7) Multiple feed and skew**

※ We recommend making a copy of the Fig. A document on page 34 and using it.

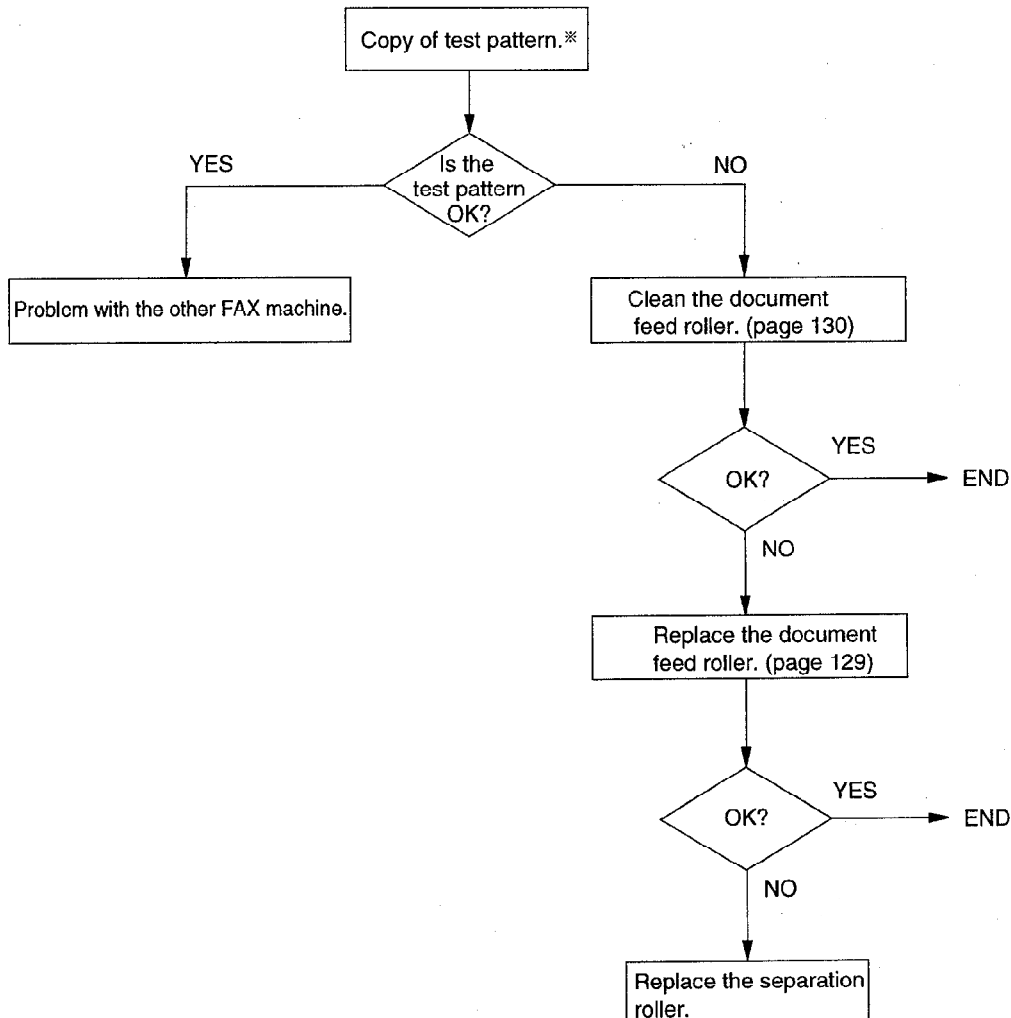
(8) The sent fax data is skewed.



(9) The received fax data is skewed.

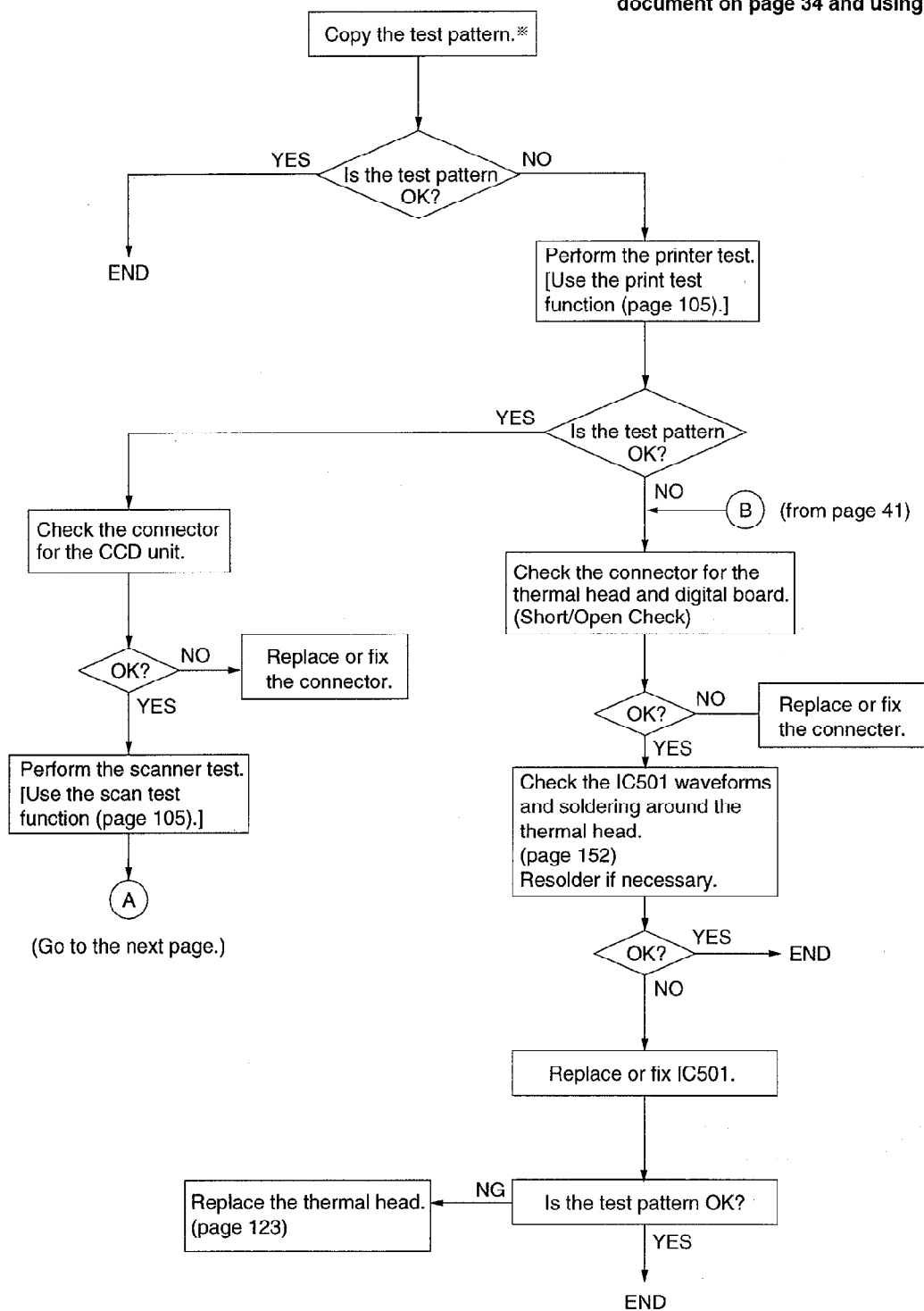


(10) Received or copied data is expanded.



(11) A blank page is copied.

※ We recommend making a copy of the Fig. A document on page 34 and using it.



(From the previous page)

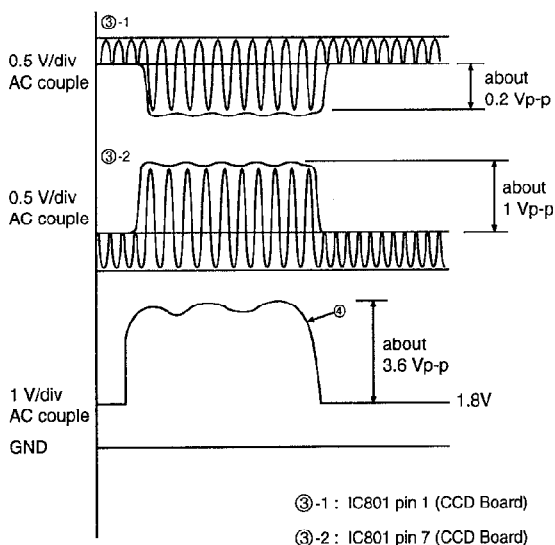
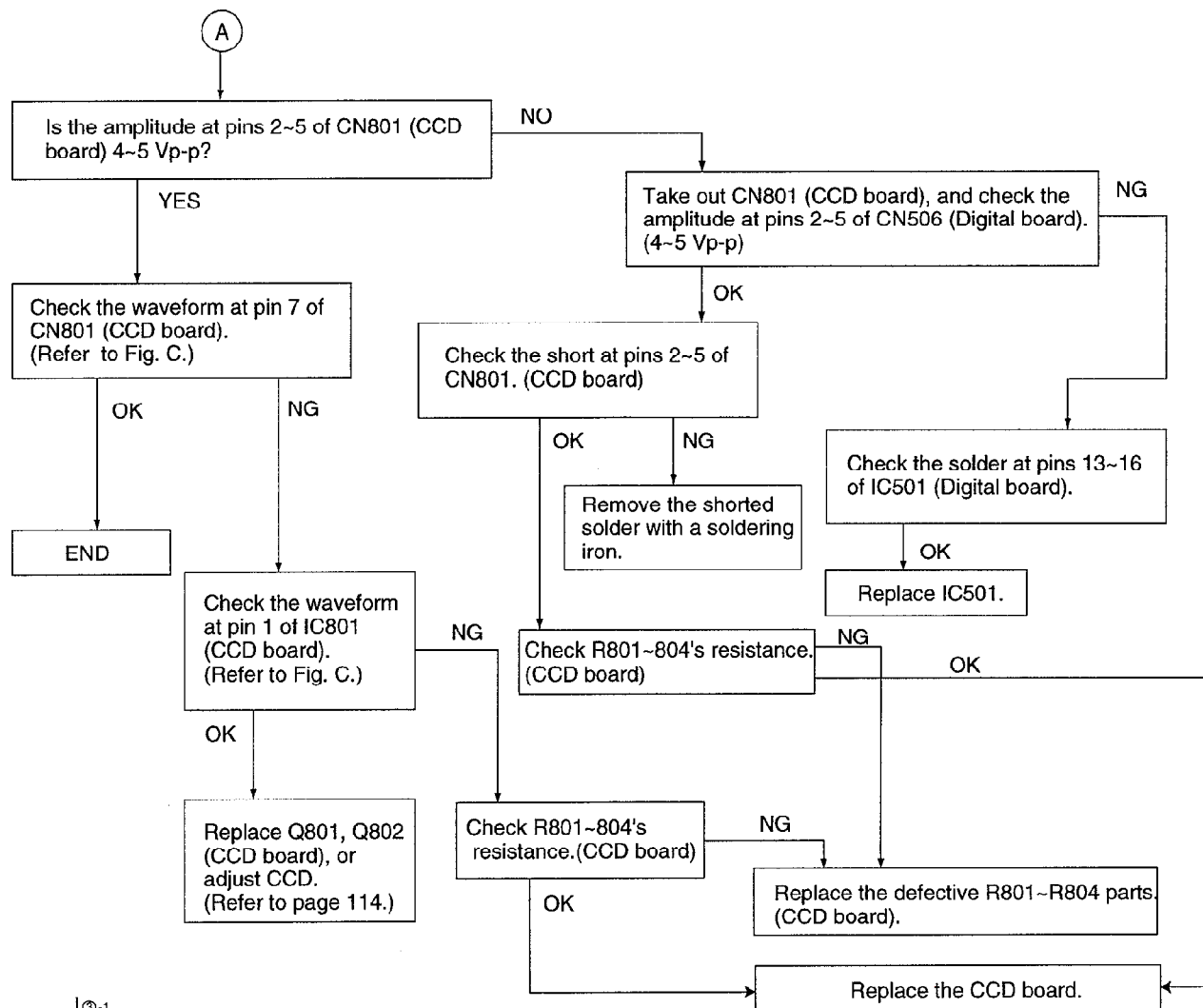
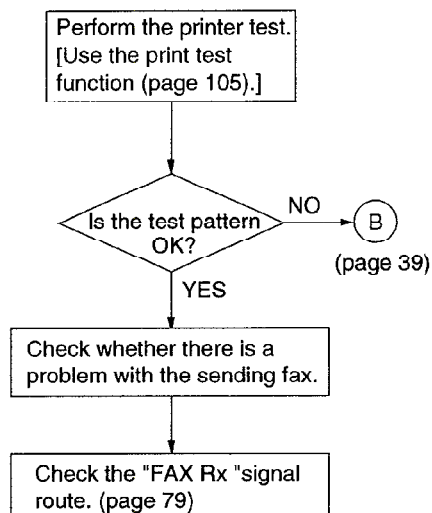


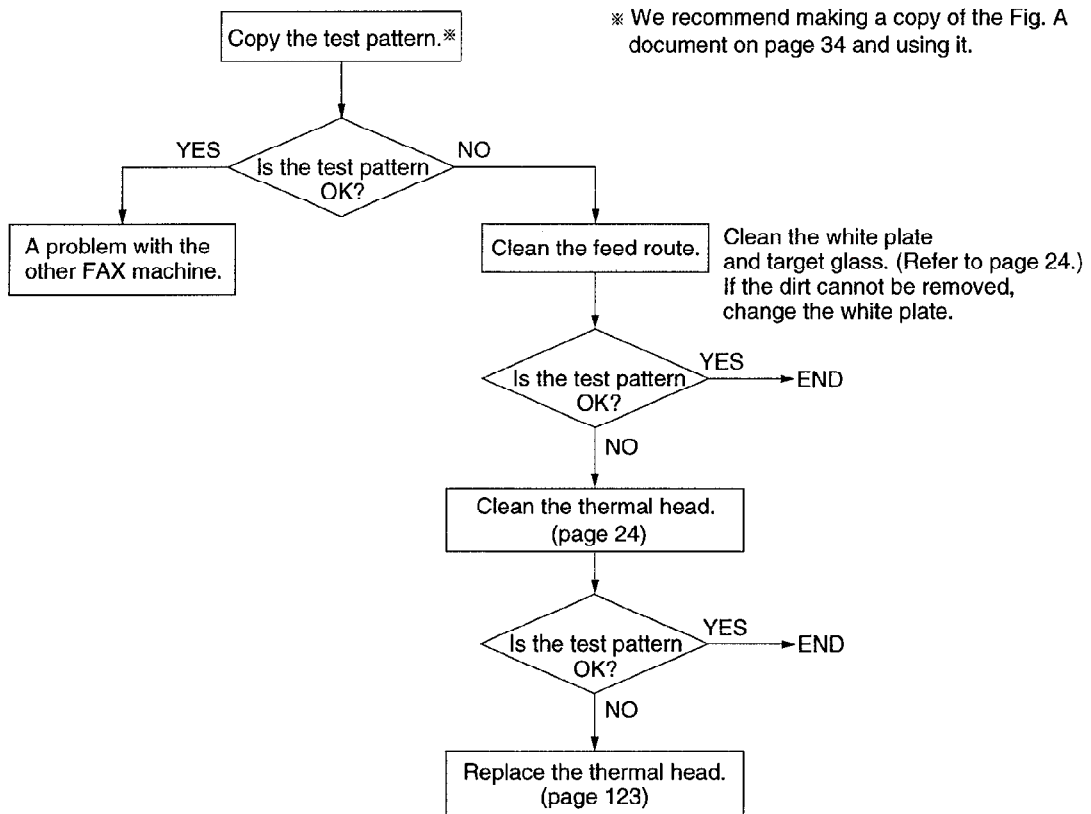
Fig. C

※ When replacing the CCD board, perform the CCD adjustment. (page 114)

(12) A blank page is received.



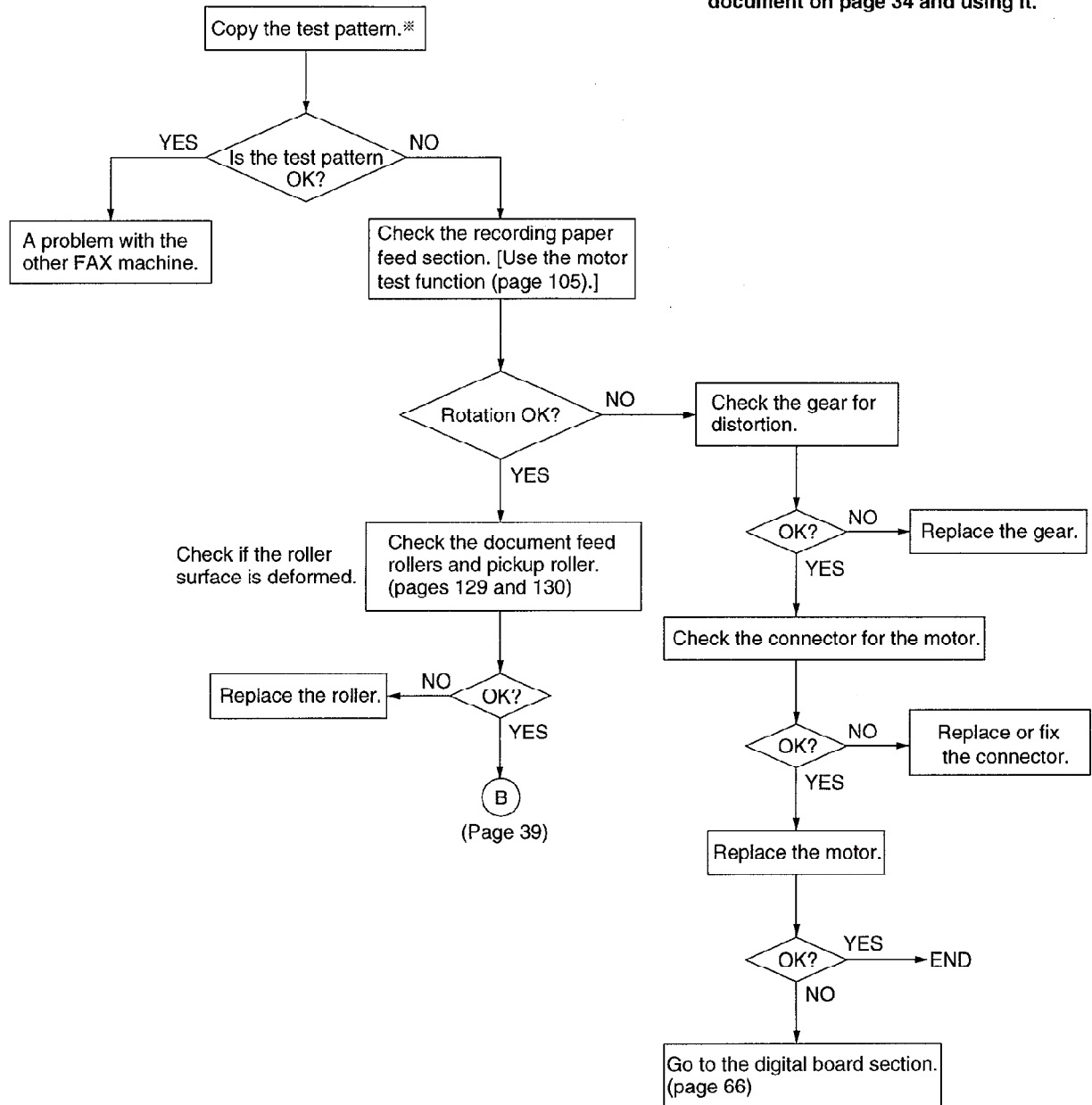
(13) Black or white vertical line



KX-FP270

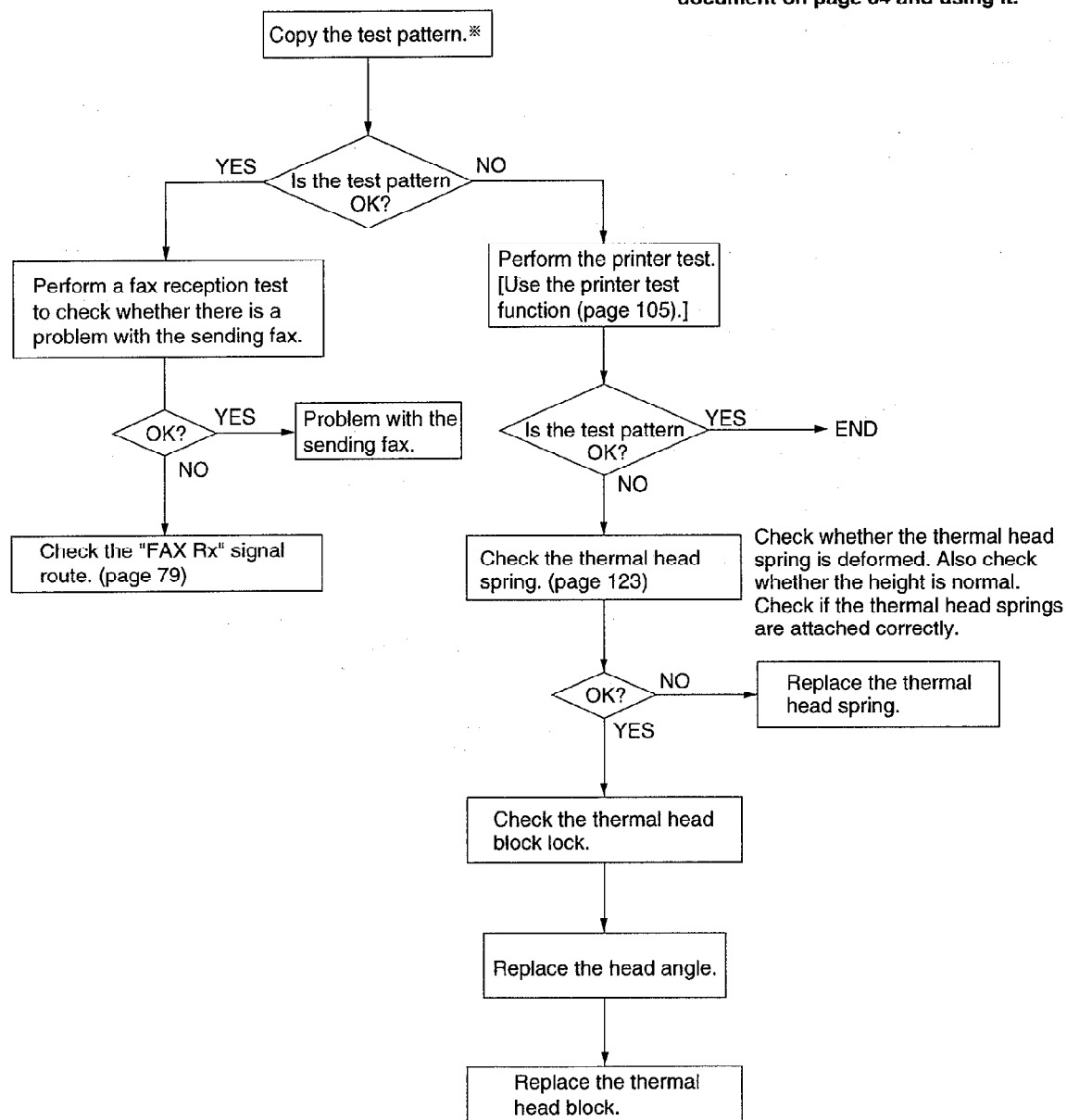
(14) Black or white lateral line on print out

※ We recommend making a copy of the Fig. A document on page 34 and using it.



(15) An abnormal image is printed.

※ We recommend making a copy of the Fig. A document on page 34 and using it.



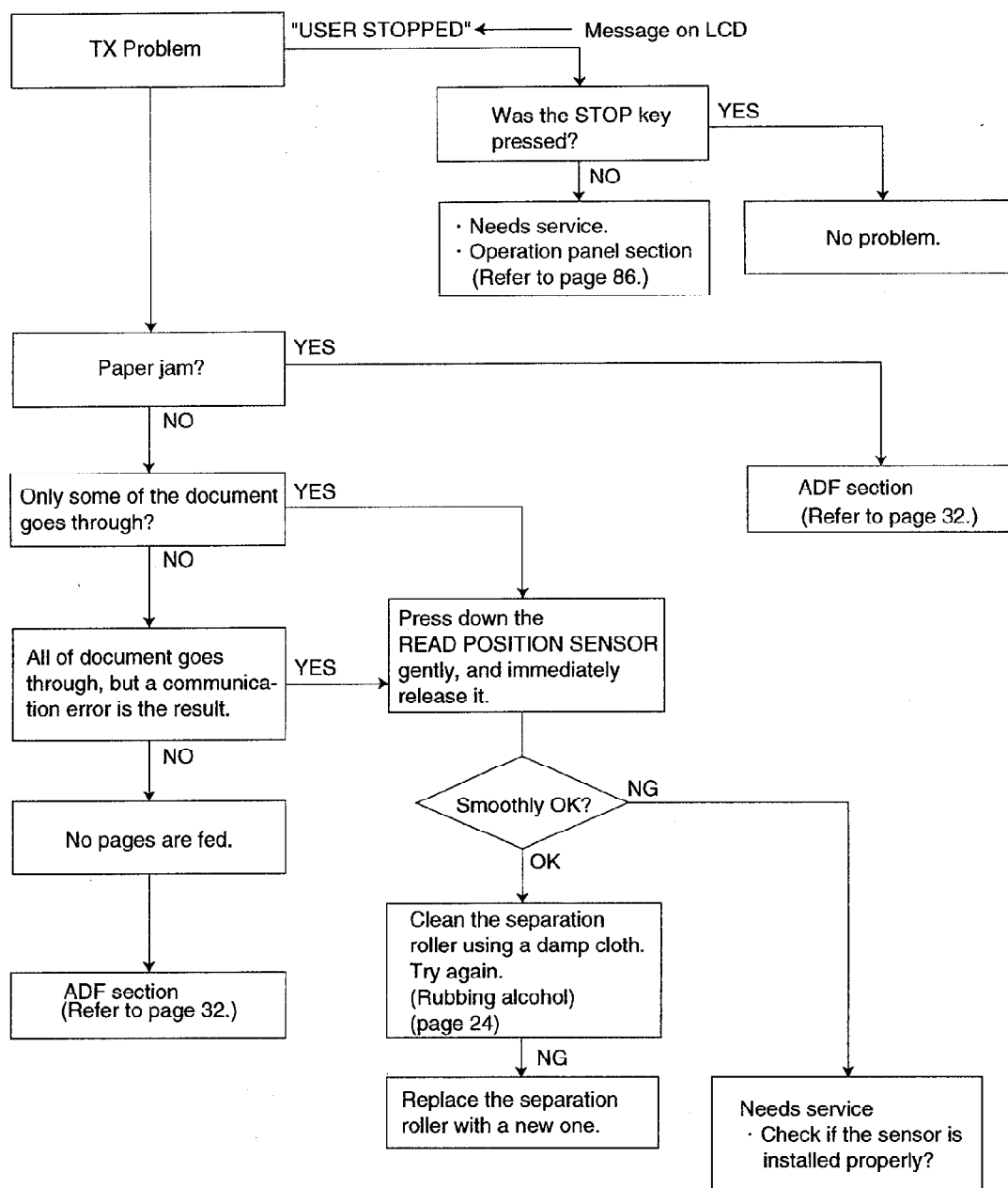
3.3.3 Communication Section

Find the problem in the table shown below, and refer to the corresponding troubleshooting procedure in the reference pages (P45 - P61).

No.	Symptom	Ref. page	Content	Possible cause
1	The paper does not feed properly when faxing. (Copying is also not possible.)	p. 45	Troubleshooting	Problem with the feeding mechanism.
2	The fax transmits successfully one time and fails another. (Copying is also possible.)	p. 46	Troubleshooting	Problem with the service line or with the receiver's fax.
3	The fax receives successfully one time and fails another. (Copying is also possible.)	p. 47	Troubleshooting	Problem with the service line or with the transmitter's fax.
4	The fax completely fails to transmit or receive. (Copying is also possible.)	p. 49	Troubleshooting	Problem with the electric circuit.
5	The fax fails either to transmit or receive when making a long distance or international call. (Copying is also possible.)	p. 50 ~ p. 52	Detailed description of the possible causes (Similar to troubleshooting items No.2 and No.3.)	Problem with the service line.
6	The fax image is poor when transmitting or receiving during a long distance or international call.	p. 52		
7	No.1-No.5	p. 53 ~ p. 61	The troubleshooting procedure for each error code will be printed on the communication result report.	

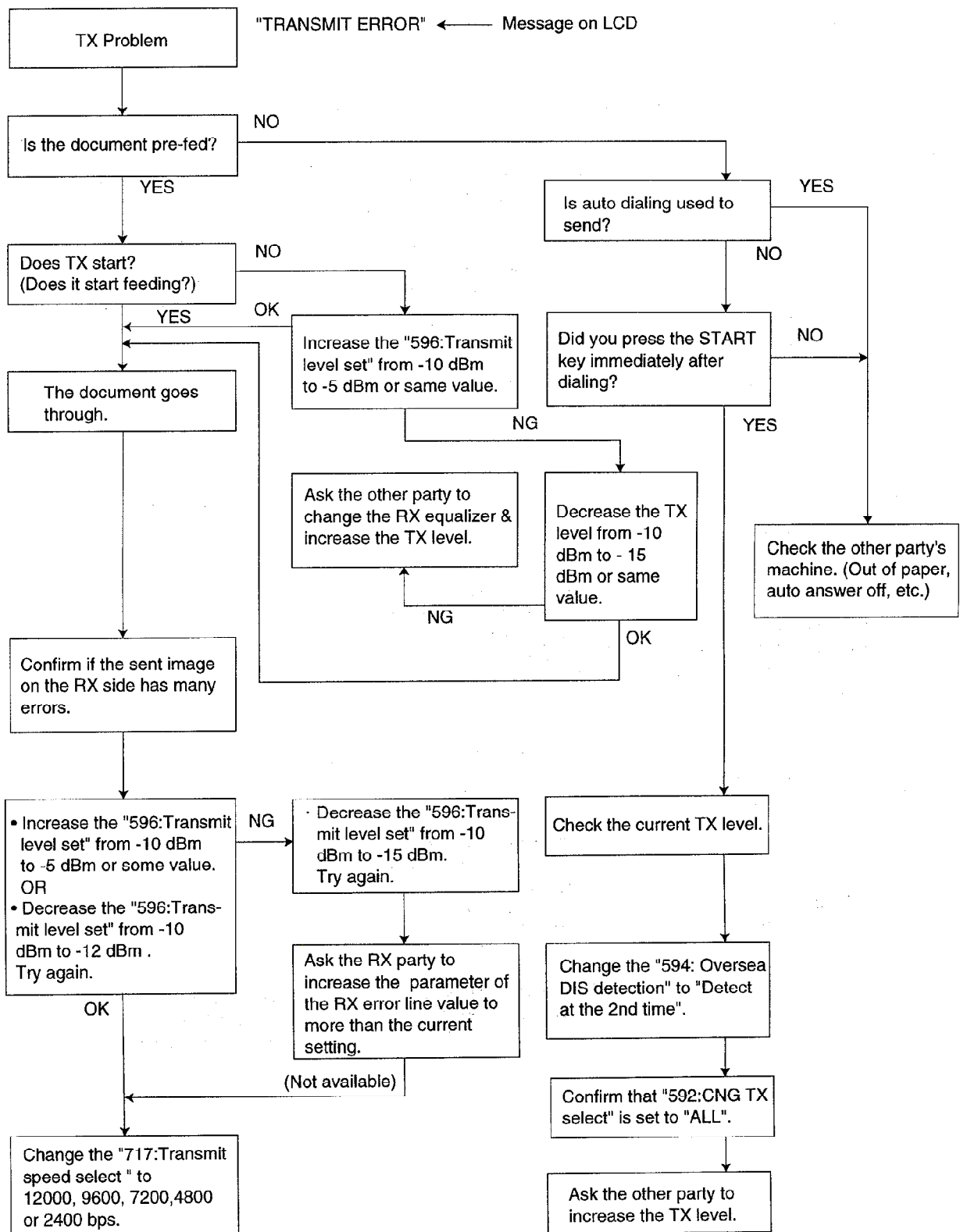
1) Defective facsimile section

① Transmit problem



KX-FP270

② Sometimes there is a transmit problem.

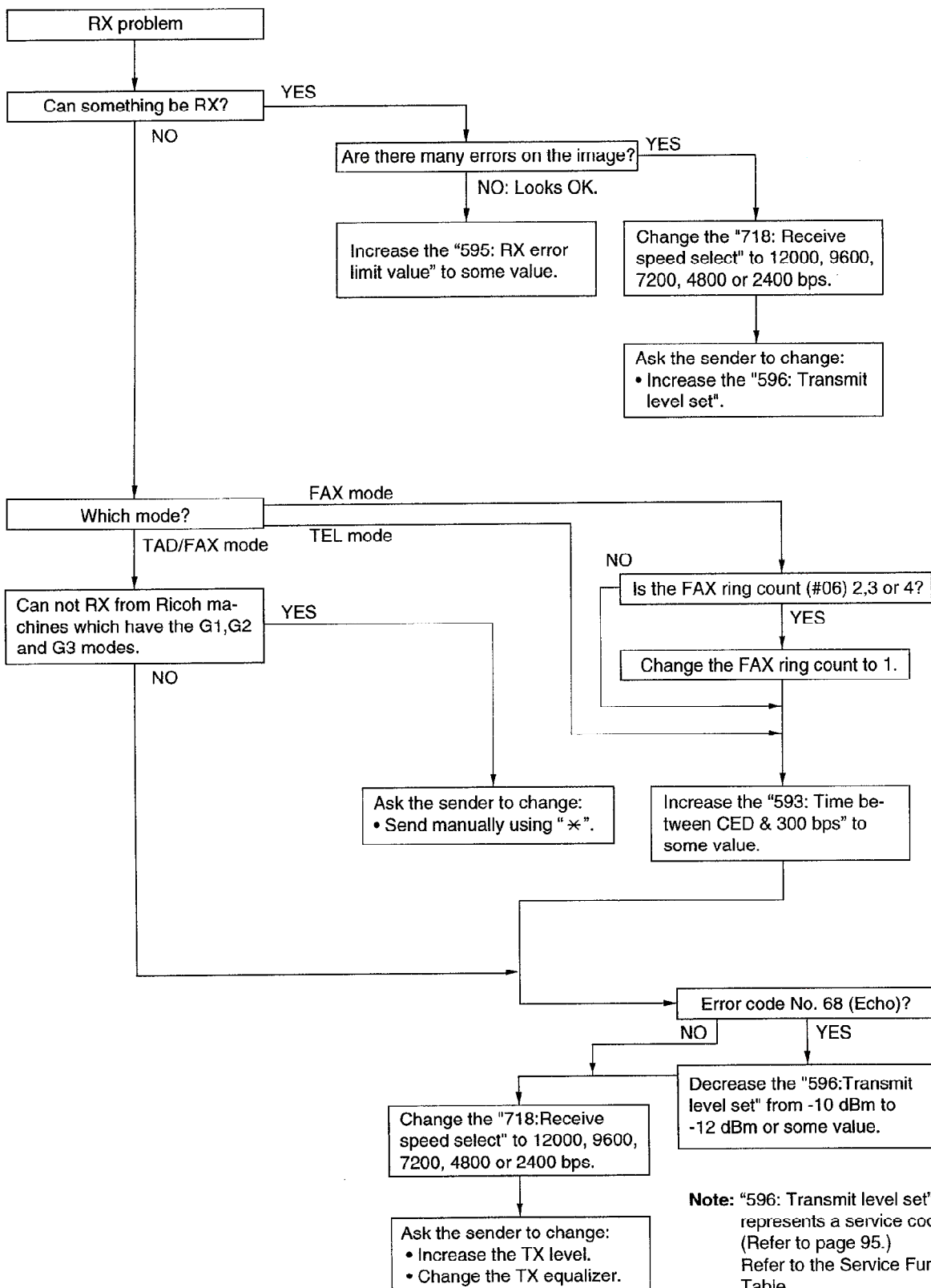


Note: "596: Transmit level set" represents a service code. (Refer to page 95.) Refer to the Service Function Table.

③ Receive problem

Confirm the following before starting troubleshooting.

- Is the recording paper installed properly? Refer to the next page.



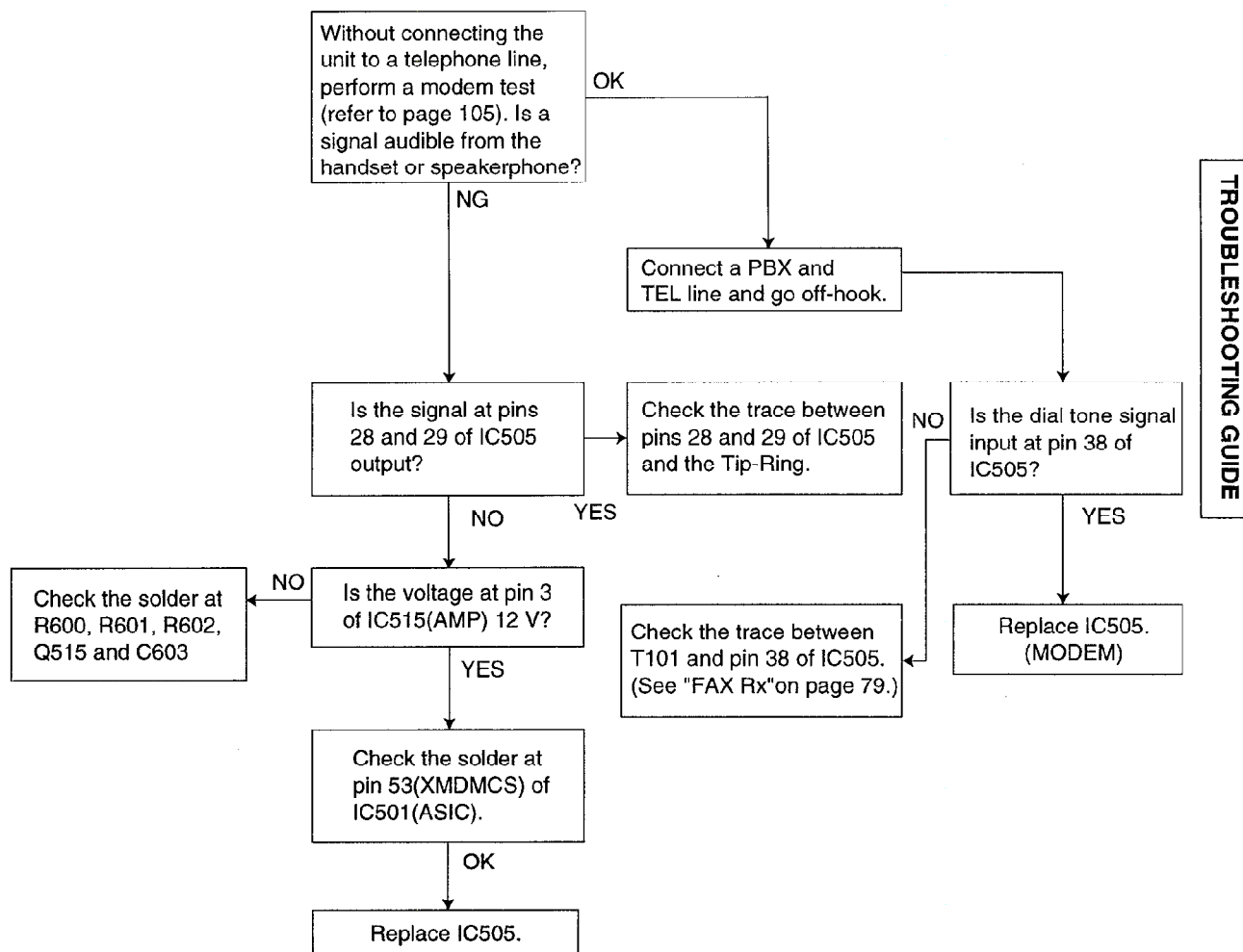
KX-FP270

For the receiving problem, we have thought of causes other than in the software. Some causes may be when the fax changes to the memory receiving mode (for example, when out of paper), and the memory becomes full of the unprinted fax data. In this case, [MEMORY FULL] and its main cause (for example, "CHECK PAPER") are displayed on the LCD. Accordingly, by solving the main problem, [MEMORY FULL] can be canceled and the receiving problem can be resolved. The causes of the display errors are shown below.

CHECK PAPER
CHECK COVER
FILM EMPTY
UNIT OVERHEATED (COVER OPEN, etc., it is necessary to reset the unit.)
PAPER JAMMED
CHECK FILM

Please refer to "2. User Recoverable Errors" (refer to page 27) for the above items.
Also, when it actually becomes a hardware deformity, please check each sensor. (Refer to page 106.)

④ The unit can copy, but cannot transmit/receive.



KX-FP270

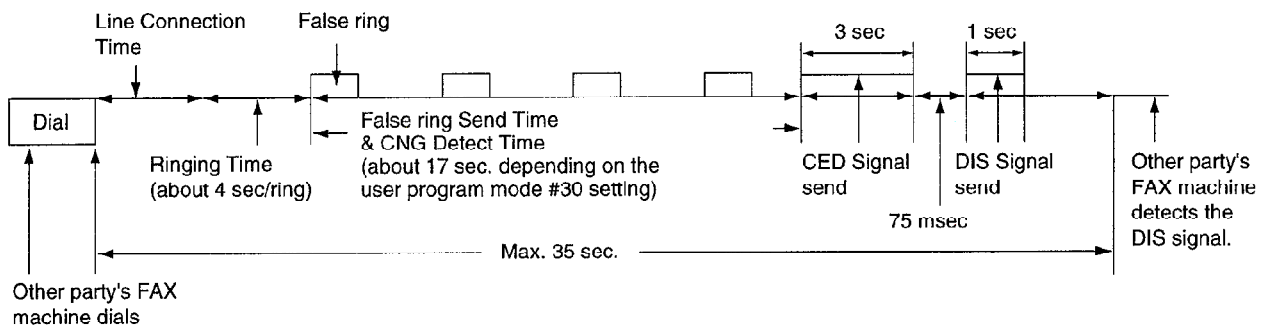
⑤ The unit can copy, but cannot either transmit/receive long distance or international communications.

The following 2 causes can be considered for this.

Cause 1:

The other party is executing automatic dialing, the call has been received by this unit, and the CED or DIS signal response time is too long. (In most cases, this unit detects the CNG signal and can respond to CED or DIS.) (According to the ITU-T standard, the communication procedure is stopped when there is no response from the other party within 35 sec, so that the other party releases the line.)

(Response Time)



(Cause and Countermeasure)

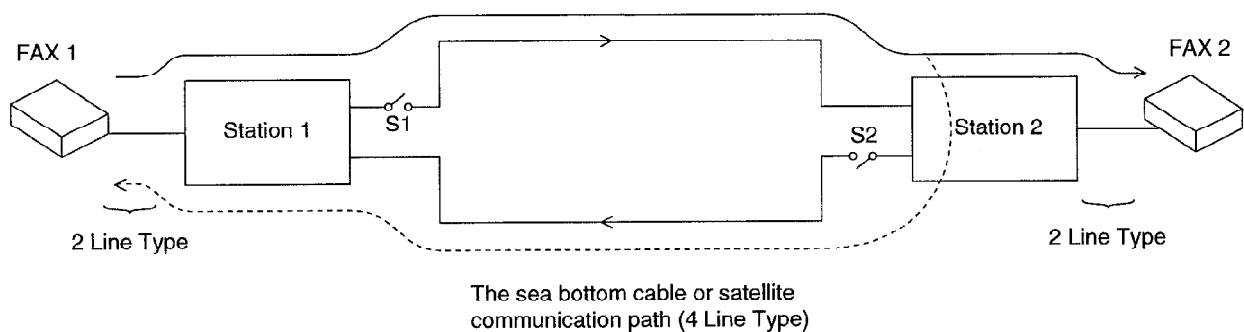
As shown in the chart above, the total handshaking time must be reduced, but because of the long distance connection and linking of several stations, the line connection time cannot be reduced. Accordingly, the following countermeasures should be tried.

(A) As the 35 sec. count is started directly after dialing or directly after the START button has been pressed for models with a START button, the other party should be called manually, if possible.

Another possibility is entering two pauses at the end of the auto dial number on the transmission side. Then the count start time can be delayed for 2 pauses (about 10 sec.).

Cause 2:

Erroneous detection because of an echo or an echo canceler.



(Echo/Echo Canceler)

The signal from FAX1 reaches FAX2 via stations 1 and 2, but the reflection signal at station 2 also returns via station 1 (echo). As the distance between station 1 and station 2 is far, the echo returns to FAX 1 at a max of 600 msec after transmission. There is a possibility that this signal is detected erroneously as the signal from FAX2. For a normal call, there is also a possibility that the echo of their own voice will make the call difficult to understand. For this reason, each station (station 1 and station 2) attaches echo cancelers (S1 and S2) for international lines or long distance lines. For the echo canceler, the level of the transmission signal from FAX 1 is compared with the level of the reception signal from FAX2. When the transmission signal is larger, S1 is closed while S2 is opened when it is smaller. In other words, for transmission from FAX1, S1 is closed and S2 is open, so that the echo does not return to FAX1.

(Causes and Countermeasures)**(Cause A)**

When a training signal is transmitted from FAX1 during the communication procedure at the time of transmission from FAX1 to FAX2, there is a delay until the echo canceler operates. S1 is closed so that a part of the head of the training signal may drop out. Normal reception by FAX2 may not be possible, and transmission may not be started.

(Countermeasure A)

When the international line mode is ON in the service mode (code No. 521), a dummy signal is attached to the head of the training signal to prevent this problem. As this normally is ON, it is necessary to reconfirm that this has not become OFF. When the international mode is switched OFF, the transmission side will try the training signal three times at each speed (9600BPS, 4800BPS and 2400BPS). If NG, it will drop the speed by one rank (fall-back). When the international mode is switched ON, each speed will be tried only twice. In other words, the slower speed with fewer errors can be accessed more easily. This is done because the line conditions may deteriorate and the picture may be disturbed more easily during communication for international lines or long distance communication, even when the training is OK. The default value is ON as preference is given to clearer pictures rather than speed.

(Cause B)

The echo canceler operation is stopped with a 2100Hz signal. (i.e. S1 and S2 become ON).

Accordingly, when FAX1 has executed automatic reception, a CED signal is output. If this signal is 2100Hz, S1 and S2 will become ON. Then the echo of the DIS signal output afterwards may be received and FAX1 may execute an erroneous operation, preventing communication from starting.

(Countermeasure B)

In the service mode, the CED signal frequency is set to 1100 Hz (code No.520), or the time setting between the CED signal and the DIS signal is set from 75 msec to 500 msec in the service mode (code No.593). This is because the echo canceler operation stop mode is canceled by an interval of 250 msec or more.

(Cause C)

This model is FAX1 and the other party is FAX2.

For transmission from this model to FAX2, FAX2 executes automatic reception and transmits a CED signal (2100 Hz) followed by a DIS signal. As the echo canceler stops as described in cause B, the echo of the DIS signal returns to FAX2. On the other hand, this model detects the DIS signal and transmits a DCS signal. In other words, it is possible that the echo of the DIS signal and the DCS signal transmitted from this model reach FAX2 one after the other. FAX2 detects an error and communication is not started.

(Countermeasure C)

When the international DIS detection setting is set in the service mode (code No.594), this model does not respond to the first DIS signal and returns a DCS signal only for the second DIS signal.

In other words, there is an interval of 250 msec between transmission of the first and second DIS signal so that the echo canceler operation recovers. An echo is not generated for the second DIS signal.

Note:

When the other FAX does not respond with a DCS signal after DIS signal transmission, the DIS signal is transmitted three times for trial.

KX-FP270**Summary:**

Long distance and international communication operations

SYMPTOM	COUNTERMEASURE
Does not receive in the automatic mode.	<ol style="list-style-type: none">1. If possible, manual transmission should be done from the transmission side.2. If possible, two pauses should be inserted at the end of the auto dial number on the transmission side.3. If possible, the Function Selector Switch should be switched to FAX.
Does not transmit.	<ol style="list-style-type: none">1. Confirm the international line mode is ON. (Service mode: code No. 521)2. Enable the international DIS detection setting. (Service mode: code No. 594)
Does not receive.	<ol style="list-style-type: none">1. Set the time setting between the CED signal and the DIS signal to 500 msec. (Service mode: code No. 593)2. Set the CED frequency to 1100Hz. (Service mode: code No. 520)

**⑥ The unit can copy, but the transmission and reception image are incorrect.
(Long distance or international communication operation)**

This widely depends on the transmission and reception capability of the other FAX unit and the line conditions.
The countermeasures for this unit are shown below.

Transmission Operation:

Set the transmitting speed to 4800BPS (service mode: code No. 717) or select the overseas mode.

Reception Operation:

If 80% or more of the reception is incorrect, set the receiving speed to 4800BPS. (Service mode: code No. 718)

- Refer to page 92 for the service mode's code setting.

⑦ How to output the Journal Report:

1. Press the MENU button.
2. Press "#", then "2" and "2".
3. Press the START/COPY/SET button.
4. Press ▼ or ▲ to select the desired setting.
5. Press the START/COPY/SET button.
6. The report prints out.

Sample of a journal report

JOURNAL							Jan. 20 1998 01:19PM
NO.	OTHER FACSIMILE	START TIME	USAGE TIME	MODE	PAGES	RESULT	*CODE
01	2345678	Jan. 20 01:18PM	00'51	SND	00	COMMUNICATION ERROR	(43)

- (3) SND: Sent directly.
IQ-FAX: Sent to the fax server.
- (2) Communication message
- (1) Error code
- (Refer to page 8)

Error code table:

RCV:Received directly

(1) CODE	(2) RESULT	(3) MODE	SYMPTOM	Counter-measure (go to the next page)
	PRESSED THE STOP KEY	TX & RX	Communication was interrupted by the STOP button.	
	DOCUMENT JAMMED	TX	The document paper is jammed.	
	NO DOCUMENT	TX	No document paper.	
	THE COVER WAS OPENED	TX & RX	The cover is open.	
40	NO RESPONSE	TX	Transmission is finished when the T1 TIMER expires.	1
41	COMMUNICATION ERROR	TX	DCN is received after DCS transmission.	2
42	COMMUNICATION ERROR	TX	FTT is received after transmission of a 2400BSP training signal.	3
43	COMMUNICATION ERROR	TX	No response after post message is transmitted three times.	4
44	COMMUNICATION ERROR	TX	RTN and PIN are received.	5
46	COMMUNICATION ERROR	RX	No response after FTT is transmitted.	6
48	COMMUNICATION ERROR	RX	No post message.	7
49	COMMUNICATION ERROR	RX	RTN is transmitted.	8
50	COMMUNICATION ERROR	RX	PIN is transmitted (to PRI-Q).	8
51	COMMUNICATION ERROR	RX	PIN is transmitted.	8
52	NO RESPONSE	RX	Reception is finished when the T1 TIMER expires.	9
54	ERROR—NOT YOUR UNIT	RX	DCN is received after DIS transmission.	11
58	COMMUNICATION ERROR	RX	DCN is received after FTT transmission.	13
59	ERROR—NOT YOUR UNIT	TX	DCN responds to the post message.	14
65	COMMUNICATION ERROR	TX	DCN is received before DIS reception.	2
65	COMMUNICATION ERROR	RX	Reception is not EOP, EOM PIP, PIN, RTP or RTN.	2
68	COMMUNICATION ERROR	RX	No response at the other party after MCF or CFR is transmitted.	13
70	ERROR—NOT YOUR UNIT	RX	DCN is received after CFR transmission.	13
72	COMMUNICATION ERROR	RX	Carrier is cut when the image signal is received.	16
75	MEMORY FULL	RX	The document was not received due to memory full.	
79	CANCELED	TX	The multistation transmission was rejected by the user.	
FF	COMMUNICATION ERROR	TX & RX	Modem error. For the DCN, DCN, etc. abbreviations, refer to "5. Modem Section" on page 162.	12

TX=TRANSMISSION RX=RECEPTION

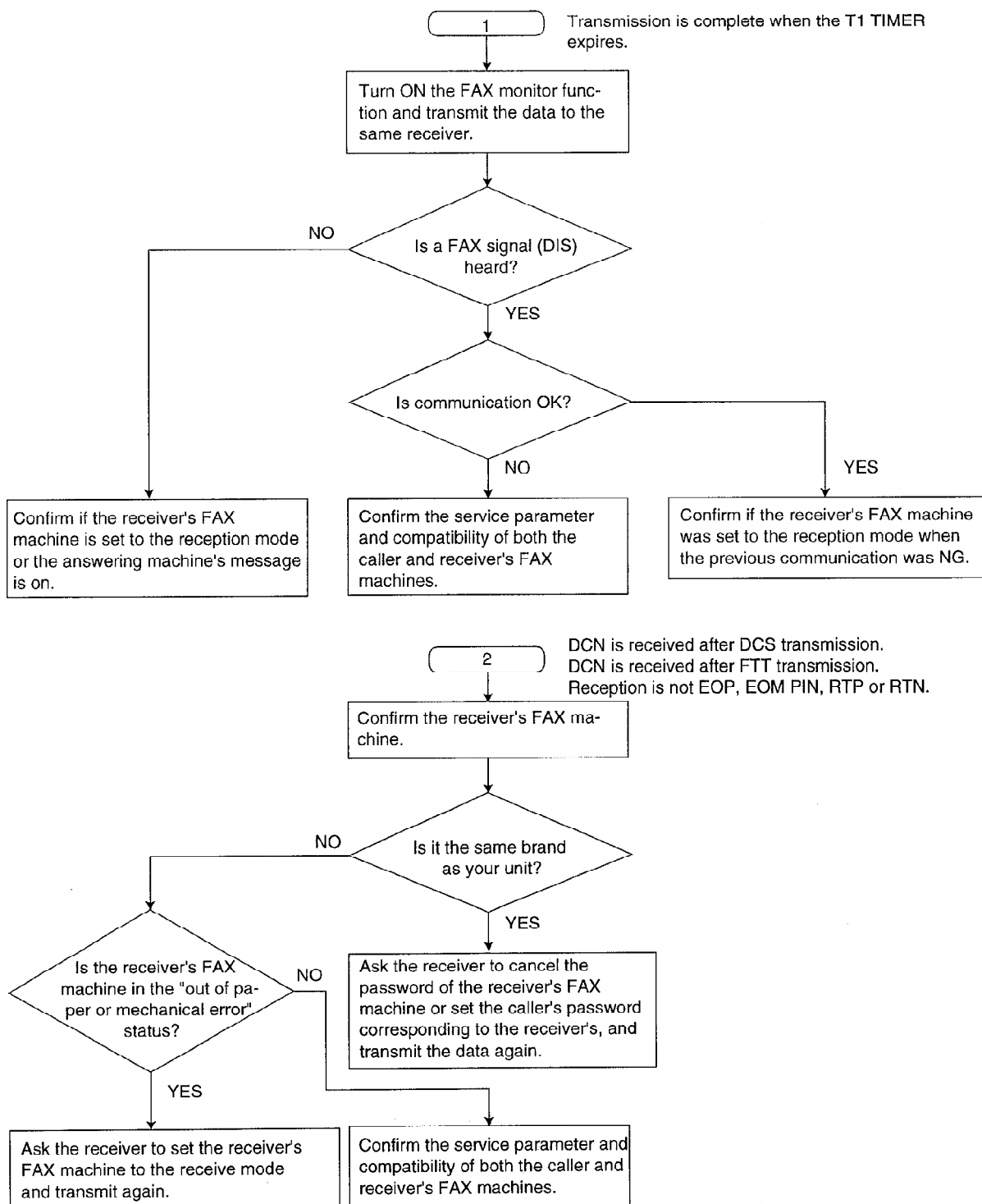
※Most fax communication problems can be resolved by the following steps.

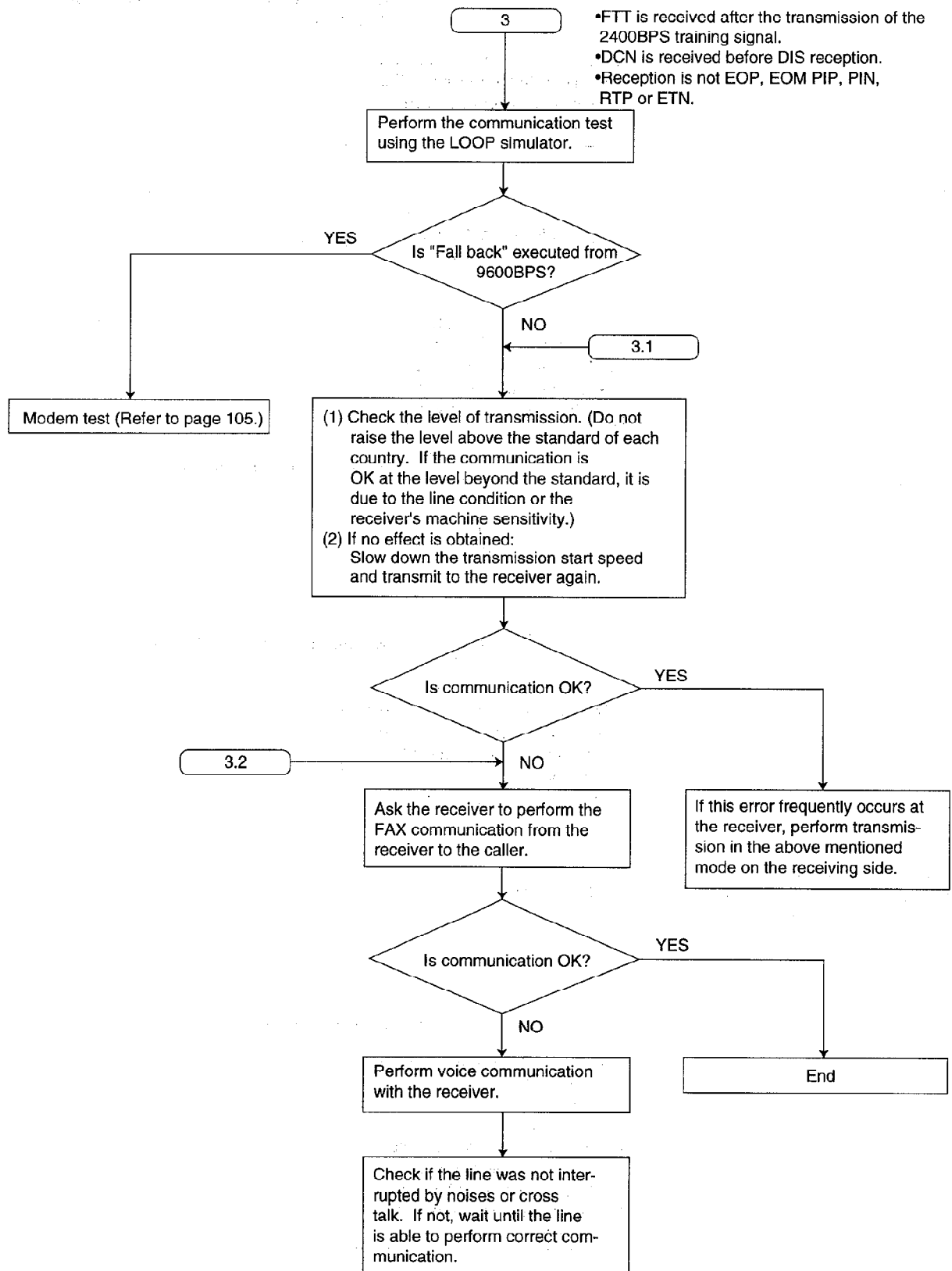
- 1) Change the transmit level. (Service code: 596, refer to page 95.)
- 2) Change the TX speed/RX speed. (Service code: 717/718, refer to page 95.)

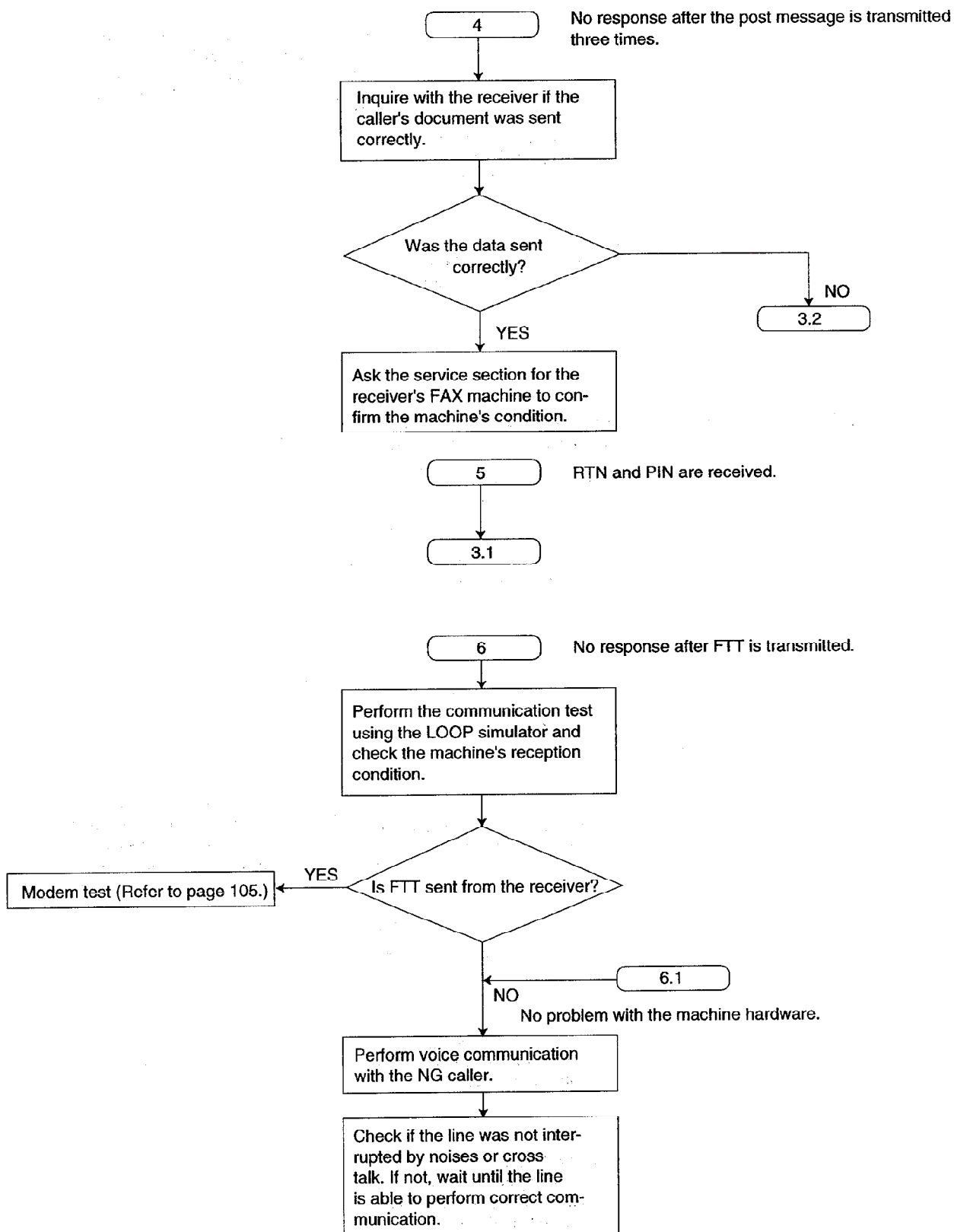
If the problem remains, see the next page.

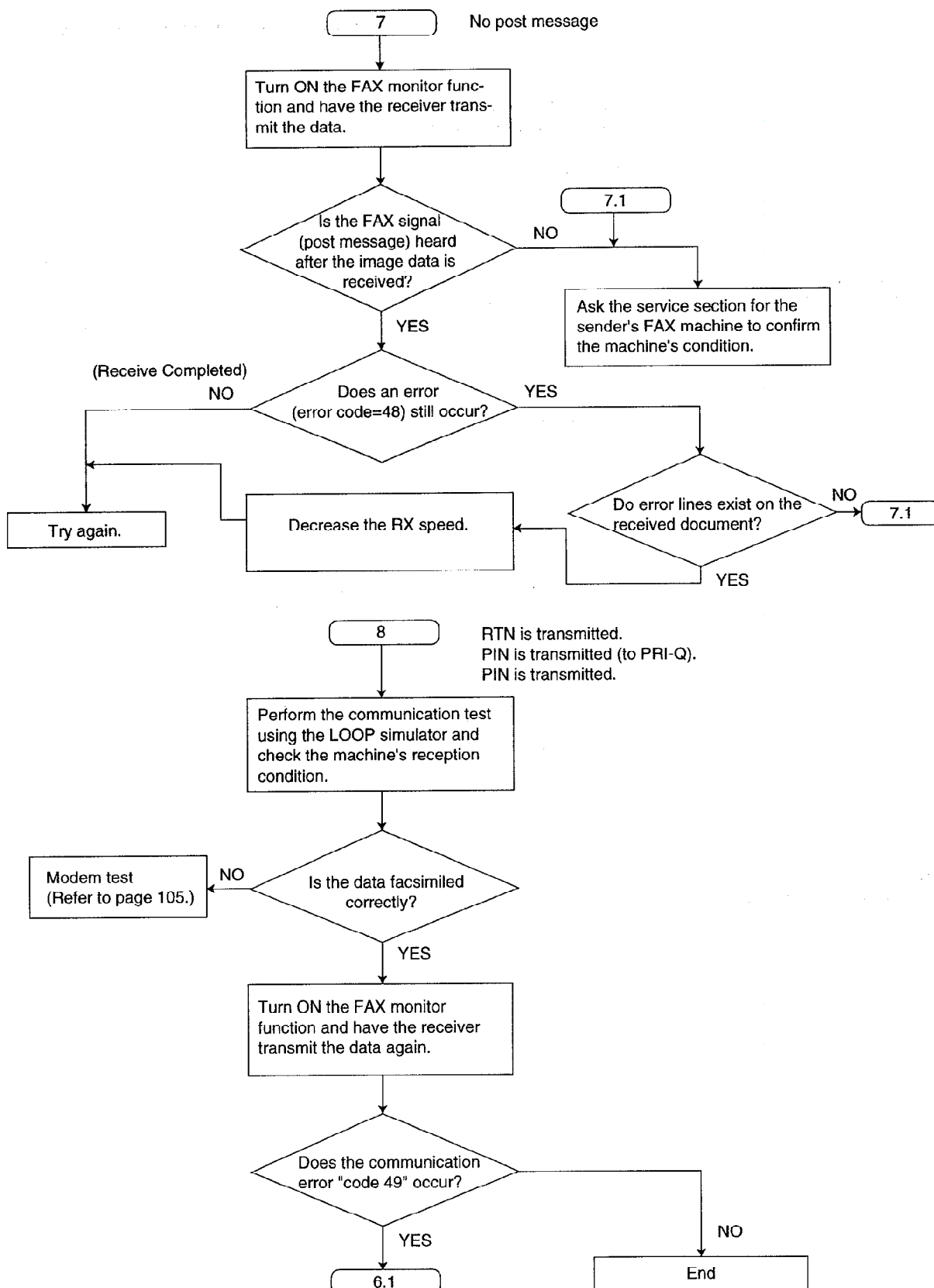
KX-FP270

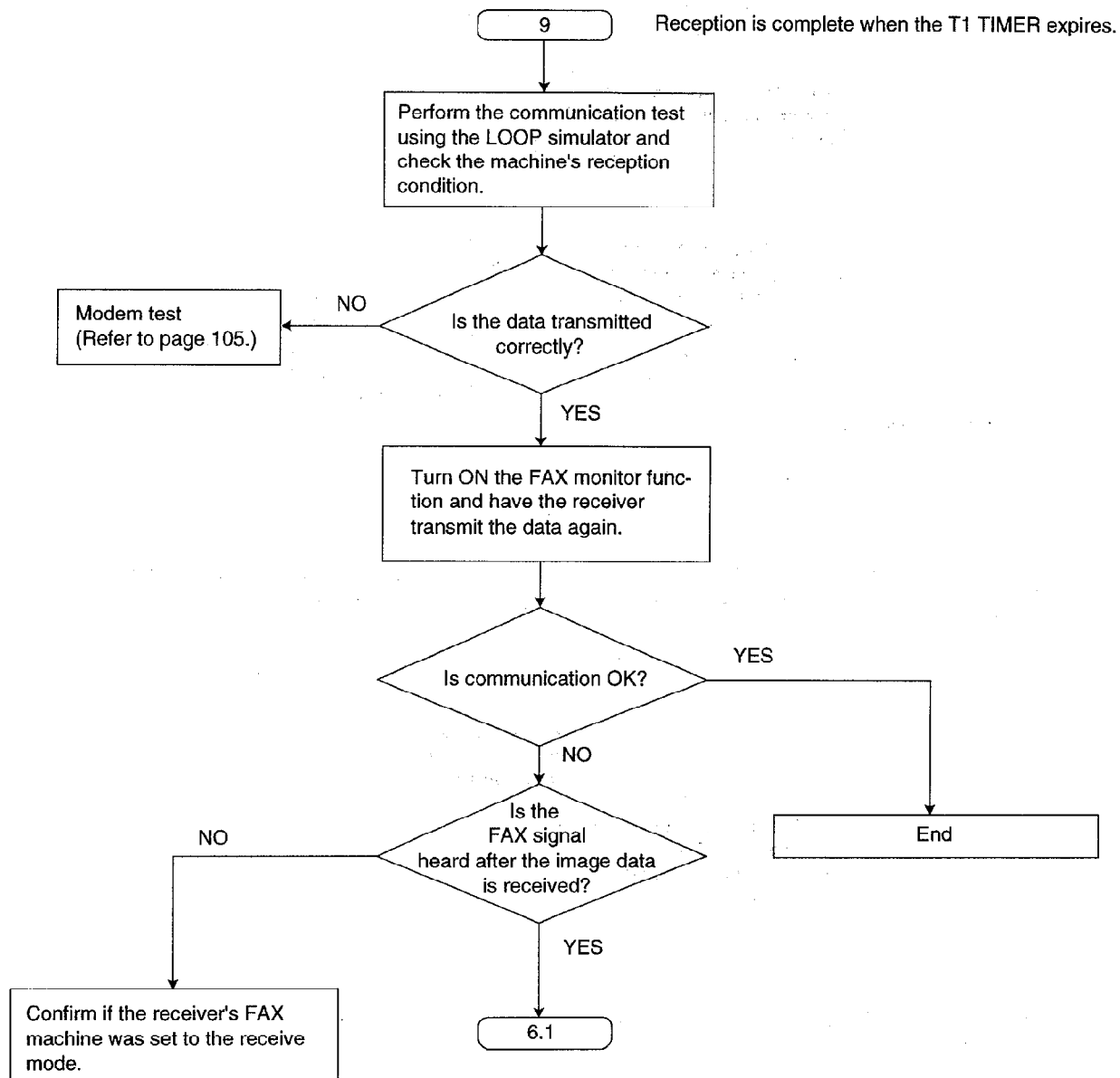
Countermeasure

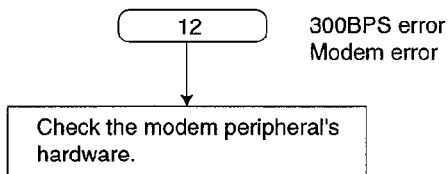
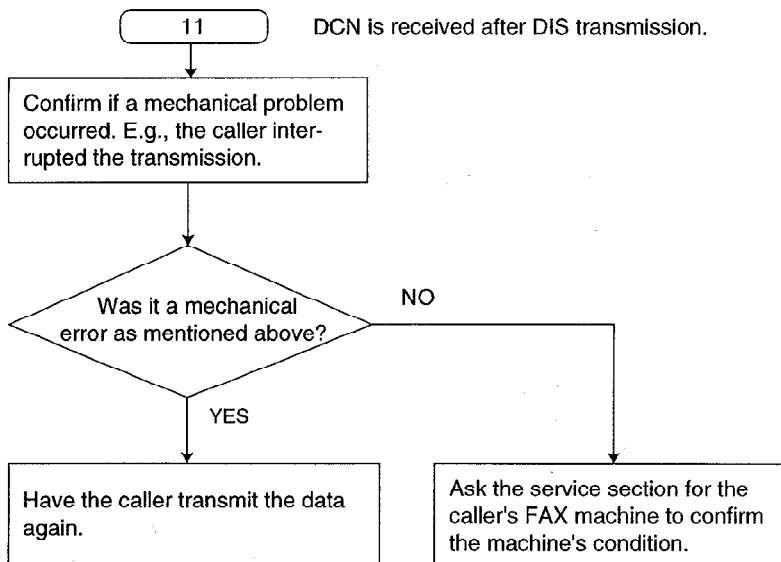
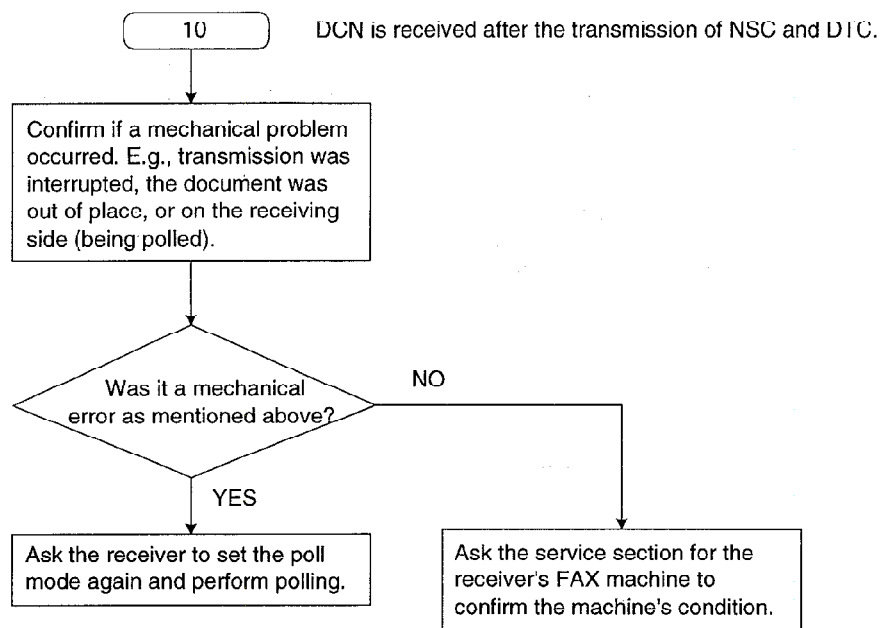


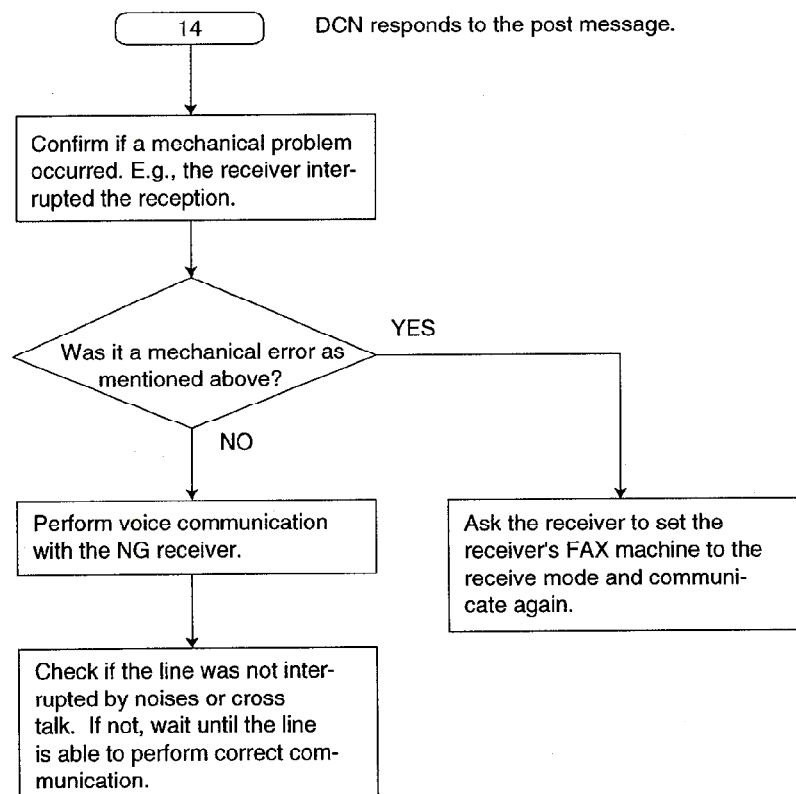
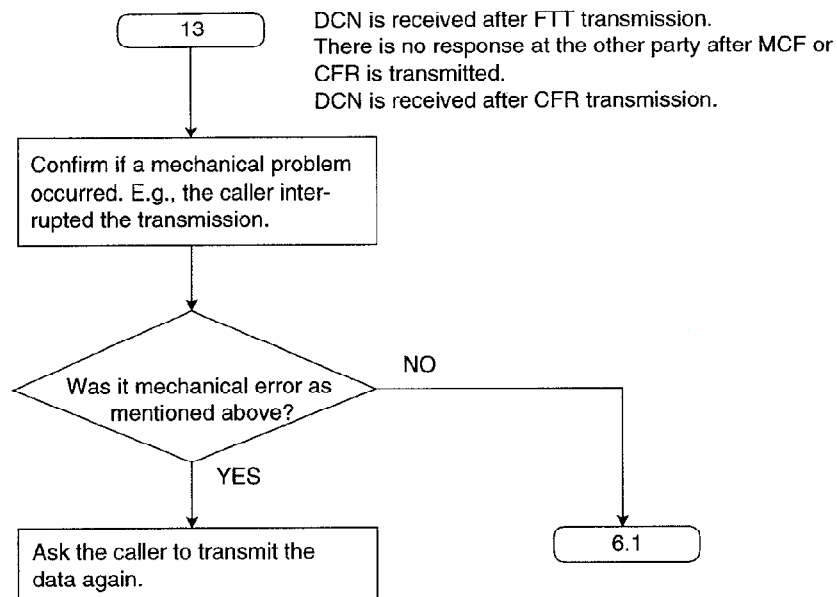


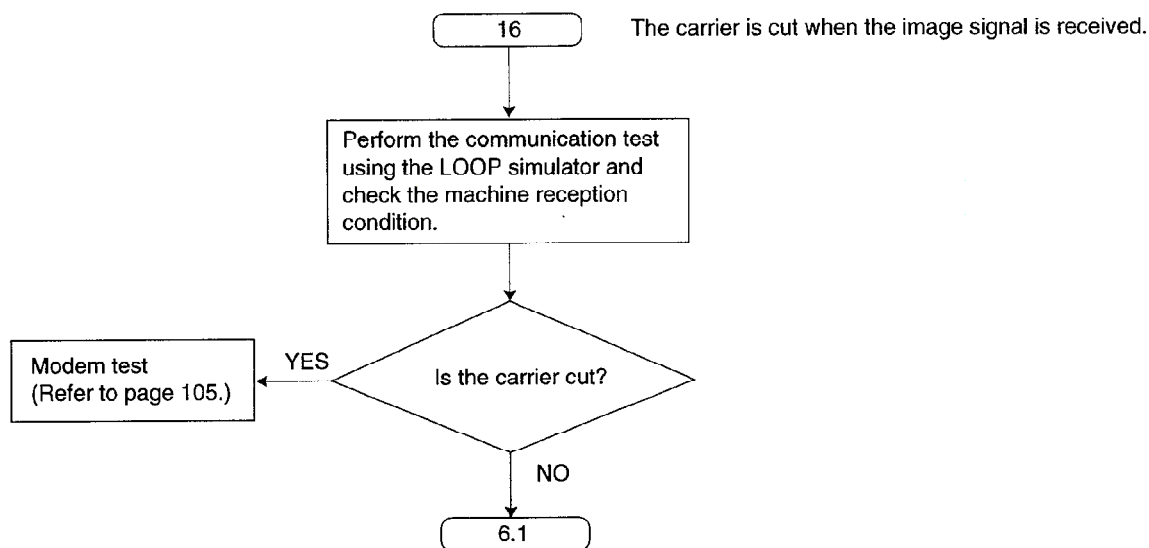
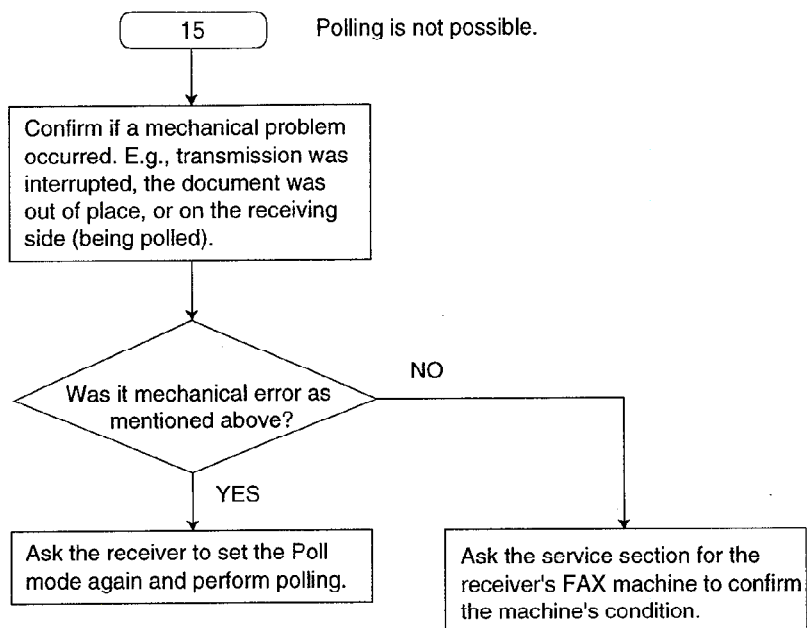












KX-FP270

2) Remote programming

If, after the call is connected, the customer describes the situation and it is determined that the problem can be corrected by making parameter changes, this function makes it possible to change parameters such as the user code and service code from another fax (using DTMF tones). Therefore, travel to the customer's location is not required. However, it is not possible to change all the parameters remotely (② Program mode table: refer to page 64). The function used to accomplish this is remote programming.

First, in order to check the current status of the service code parameter, out put the setup list (code: 991) and service list (code: 999) from the customer's fax machine.

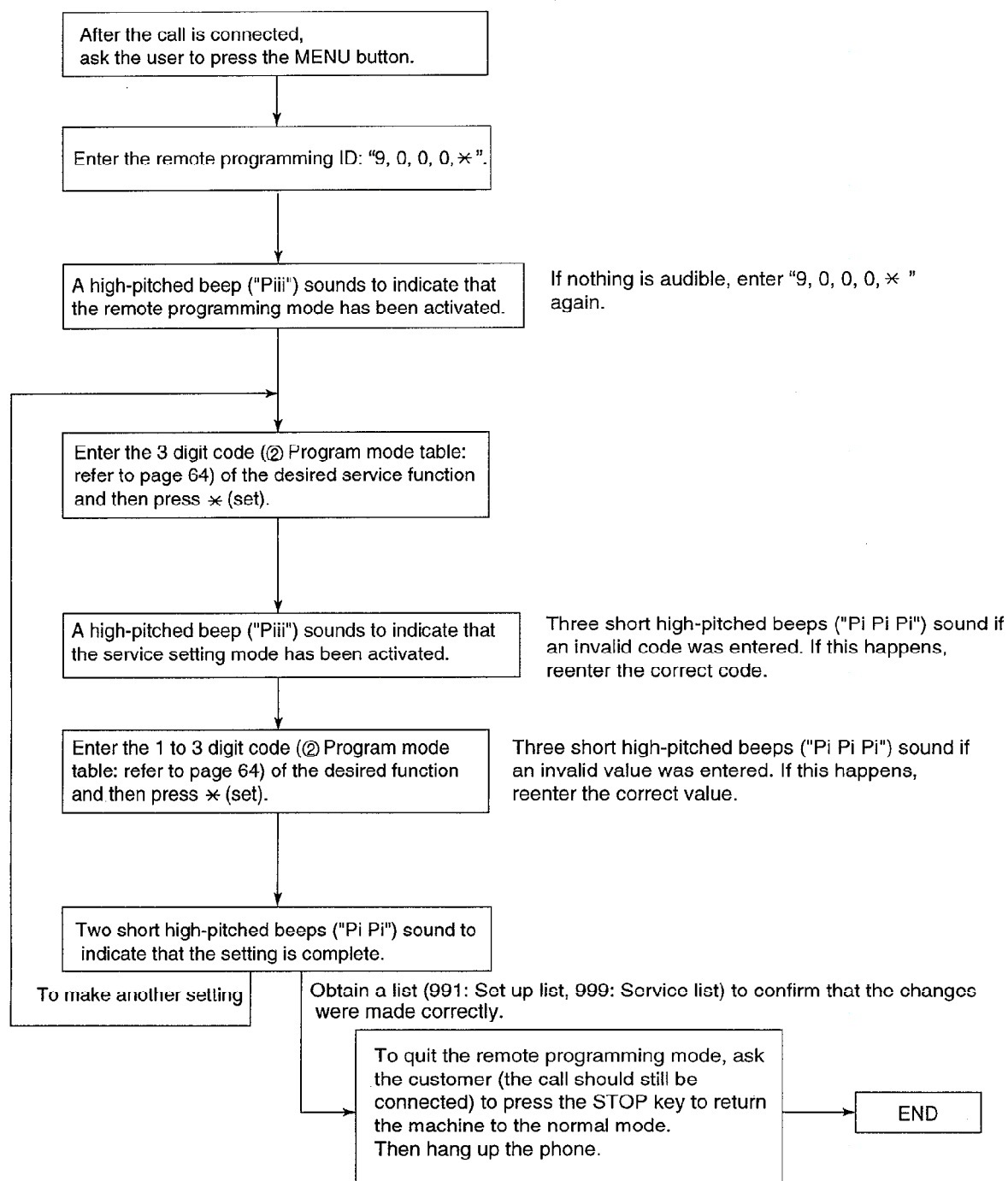
Based on this, the parameters for the desired codes can be changed.

The procedure for changing and listing parameters is described on the next page. Also, before exiting the remote programming mode, it is advisable to obtain a new list to confirm that only the desired parameters were changed.

Hint:

Since the connected telephone is in use during the remote programming mode, it may be helpful to ask the customer to switch to the speakerphone. This frees the customer from the need to remain right next to the fax while you are making parameter settings. When finished, inform the customer. Also note that in very noisy locations where the DTMF tones are not audible, the remote programming function will not work.

① Entering the remote programming mode and changing service codes



KX-FP270
② Program Mode Table

Code	Function	Set Value	Default	Remote Setting
001	Set date and time	mm/dd/yy hh:mm	Jan/01/98	NG
002	Your logo	-----	None	NG
003	Your telephone number	-----	None	NG
004	Transmission report mode	1:Error / 2:ON / 3:OFF	Error	OK
006	FAX ring count	1~4	2	OK
	TAD/FAX ring count	1~4/TOLL SAVER/RINGER OFF	2	OK
	Not available in TEL/FAX mode	-----	-----	OK
010	Recording time	1:VOX/2:MIN	VOX	OK
011	Remote ANS ID	-----	ID=111	NG
013	Dialing mode	1:Pulse / 2:Tone / 3:Auto	Auto	OK
015	Memory XMT	1:ON / 2:OFF	OFF	OK
022	Auto journal print	1:ON / 2:OFF	ON	OK
023	Overseas mode	ON / OFF	OFF	NG
025	Delayed transmission	ON / OFF	OFF	NG
026	Auto caller list	1:ON / 2:OFF	ON	OK
030	Silent FAX recognition ring	3 to 6 rings	3	OK
031	Distinctive ring	1:OFF / 2:A / 3:B / 4:C / 5:D	OFF	OK
036	Rx reduction	1:92% / 2:86% / 3:72% / 4:OFF	92%	OK
039	LCD contrast	1:Normal / 2:Darker	Normal	OK
040	Silent detection	1:ON / 2:OFF	ON	OK
041	Remote FAX activation code	ON / OFF	ON ID=*9	NG
042	Message alert	1:ON / 2:OFF	OFF	OK
043	REC. time alert	1:ON / 2:OFF	OFF	OK
044	Receive alert	1:ON / 2:OFF	ON	OK
046	Friendly receive	1:ON / 2:OFF	ON	OK
047	FAX voice guidance	1:ERROR/2:ON/3:OFF	ON	OK
054	Common greeting MSG. REC. time	1:16s/2:60s	16s	OK
060	Message transfer	MESSAGE/PAGER/OFF	OFF	NG
061	Transfer greeting	CHECK/RECORD ERASE	CHECK	NG
067	ICM monitor	1:ON / 2:OFF	ON	OK
070	FAX Pager	ON / OFF	OFF	NG
075	IQ-FAX	1:ON / 2:OFF	OFF	OK
076	FAX tone	1:ON / 2:OFF	ON	OK
077	Auto answer mode	1:TAD/FAX 2: FAX Only 3:TEL/FAX	TAD/FAX	OK
078	TEL/FAX ring	1 to 4 rings	2	OK
079	Film detection	1:ON / 2:OFF	ON	OK
080	Set default	YES / NO	NO	NG
501	Pause time set	001~600 x 100msec	050	OK
502	Flash time set	01~99 x 10msec	70	OK
503	Dial speed	1:10pps / 2:20 pps	10pps	OK
510	Vox time	1:6sec / 2:4sec	6sec	OK
520	CED frequency select	1:2100Hz / 2:1100Hz	2100	OK
521	International mode select	1:ON / 2:OFF	ON	OK
522	Auto standby select	1:ON / 2:OFF	ON	OK
523	Receive equalizer select	1:0km / 2:1.8km / 3:3.6km / 4:7.2km	0km	OK
524	Transmission equalizer select	1:0km / 2:1.8km / 3:3.6km / 4:7.2km	0km	OK
533	Setting the number of times that message transfers is redialed.	00~99	03	OK
534	Setting of the message transfer/pager call redial interval	001~999	030	OK
550	Memory clear	-----	-----	NG
551	ROM check	-----	-----	NG
552	DTMF signal tone test	ON / OFF	OFF	NG
553	Monitor on FAX communication	1:OFF / 2:Phase B / 3:ALL	OFF	OK
554	Modem test	-----	-----	NG
555	Scanner test	-----	-----	NG

Code	Function	Set Value	Default	Remote Setting
556	Motor test	-----	-----	NG
557	LED test	-----	-----	NG
558	LCD test	-----	-----	NG
559	Document jam detection	1:ON / 2:OFF	ON	OK
561	Key test	-----	-----	NG
563	CCD position adjustment	00~30	-----	OK
570	Break % select	1:61% / 2:67%	61%	OK
571	ITS auto redial time set	00~99	14	OK
572	ITS auto redial line disconnection time set	001~999sec	30	OK
573	Remote turn-on ring number	01~99	15	OK
580	TAM continuous tone detection	1:ON / 2:OFF	ON	OK
590	FAX auto redial time set	00~99	05	OK
591	FAX auto redial line disconnection time set	001~999sec	045	OK
592	CNG transmit select	1:OFF / 2:ALL / 3:AUTO	ALL	OK
593	Time between CED and 300 bps	1:75ms / 2:500ms / 3:1sec	75ms	OK
594	Overseas DIS detection	1:1st / 2:2nd	1st	OK
595	Receive error limit value	001~999	100	OK
596	Transmit level set	-15~00dBm	-10	OK
598	Receiving Sensitivity	20~48	43	OK
599	ECM frame size	1:286 byte / 2:64 byte	256 byte	OK
602	Warning list printing	1:ON / 2:OFF	ON	OK
717	Transmit speed select	1:14400/ 2:12000/ 3:9600/ 4:7200/ 5:4800/ 6:2400	14400bps	OK
718	Receive speed select	1:14400/ 2:12000/ 3:9600/ 4:7200/ 5:4800/ 6:2400	14400bps	OK
719	Ringer off in TEL/FAX mode	1:ON / 2:OFF	ON	OK
721	Pause tone detect	1:ON / 2:OFF	ON	OK
722	Redial tone detect	1:ON / 2:OFF	ON	OK
731	CPC mode	1:A / 2:B / 3:OFF	A	OK
732	Auto disconnect	1:350ms / 2:1800ms / 3:OFF	350msec	OK
745	Power on film feed	1:ON / 2:OFF	ON	OK
763	CNG detect time for friendly reception	1:10s / 2:20s / 3:30s	20s	OK
771	T1 timer	1:35s / 2:60s	35s	OK
775	Monitoring of message transfer	1:ON / 2:OFF	OFF	OK
784	Voice prompt	1:Start	-----	NG
815	Sensor & VOX test	-----	-----	NG
841	Digital SP-Phone RX & TX check	1:SP-Phone	-----	NG
852	Print test pattern	-----	-----	NG
853	Top margin	1~9	-----	OK
854	Left margin	1~8	-----	OK
861	A4 size set	1:ON / 2:OFF	OFF	OK
880	History list	1:Start	-----	NG
881	Journal 2	1:Start	-----	NG
882	Journal 3	1:Start	-----	NG
890	TEL/FAX ring back tone	1:ON / 2:OFF	ON	OK
991	Setup list	1:Start	-----	OK
994	Journal list	1:Start	-----	OK
995	Journal 2 list	1:Start	-----	OK
996	Journal 3 list	1:Start	-----	OK
998	History list	1:Start	-----	OK
999	Service list	1:Start	-----	OK

Note: Refer to page 94 for descriptions of the individual codes.

OK means "can set".

NG means "can not set".

For example, the "004 Transmission report mode" set value "1:ERROR/2:ON/3:OFF" number corresponds to the number dialed.

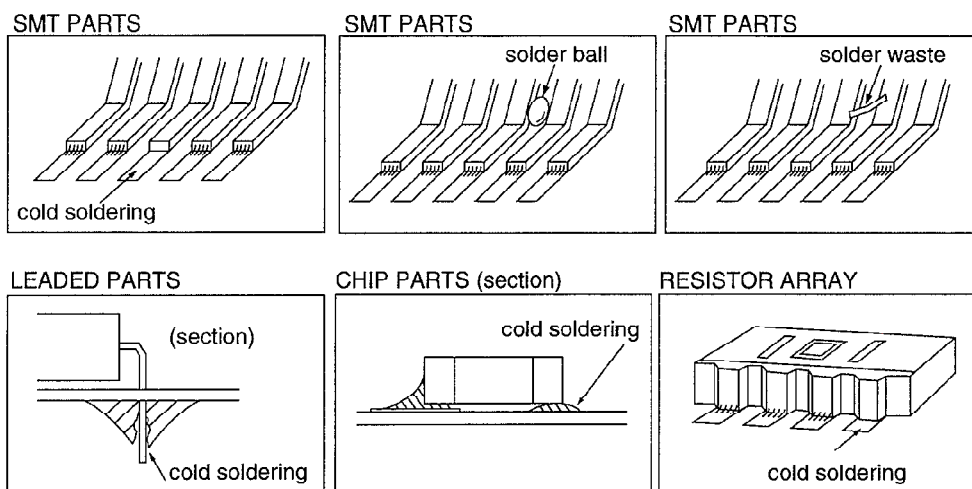
3.3.4 Digital board section

One of most difficult problems to deal with is when the system will not boot up.

The symptom: No response when the power is turned on. (No LCD display, keys are not accepted.)

Then first thing to do is check the power source. If there is no problem with the power supply unit, then there is a problem with the digital unit (main board).

As there are many potential causes in this case (ASIC, DRAM, etc.), it may be difficult to specify what you should check first. If a mistake is made in the order of checks, a normal part may be determined faulty, wasting both time and money. Although the tendency is to regard the problem as a serious one (IC malfunction, etc.), usually most cases are caused by solder faults (poor contact due to a tunnel in the solder, signal short circuit due to solder waste).



Note:

1. Electrical continuity may have existed at the factory check, but a faulty contact occurred as a result of vibration, etc., during transport.
2. Solder waste remaining on the board may get caught under the IC during transport, causing a short circuit.

Before we begin mass production, several hundred trial units are produced at the plant, various tests are applied and any malfunctions are analyzed. (In past experiences, digital IC (especially SRAM, DRAM and ROM) malfunctions are extremely rare after installation in the product.)

This may be repaired by replacing the IC, (DRAM etc.). However, the real cause may not have been an IC malfunction but a soldering fault instead.

Soldering faults difficult to detect with the naked eye are common, particularly for ASIC and RA (Resistor Array). But if you have an oscilloscope, you can easily determine the problem site or IC malfunction by checking the main signal lines.

Even if you don't have such a measuring instrument, by checking each main signal line and resoldering it, in many cases the problem will be resolved.

An explanation of the main signals (for booting up the unit) is below.

Don't exchange ICs or stop repairing until checking the signal lines.

An IC malfunction rarely occurs. (By understanding the necessary signals for booting up the unit, the "Not Boot up" display is not a serious problem.)

What are the main signals for booting up the unit?

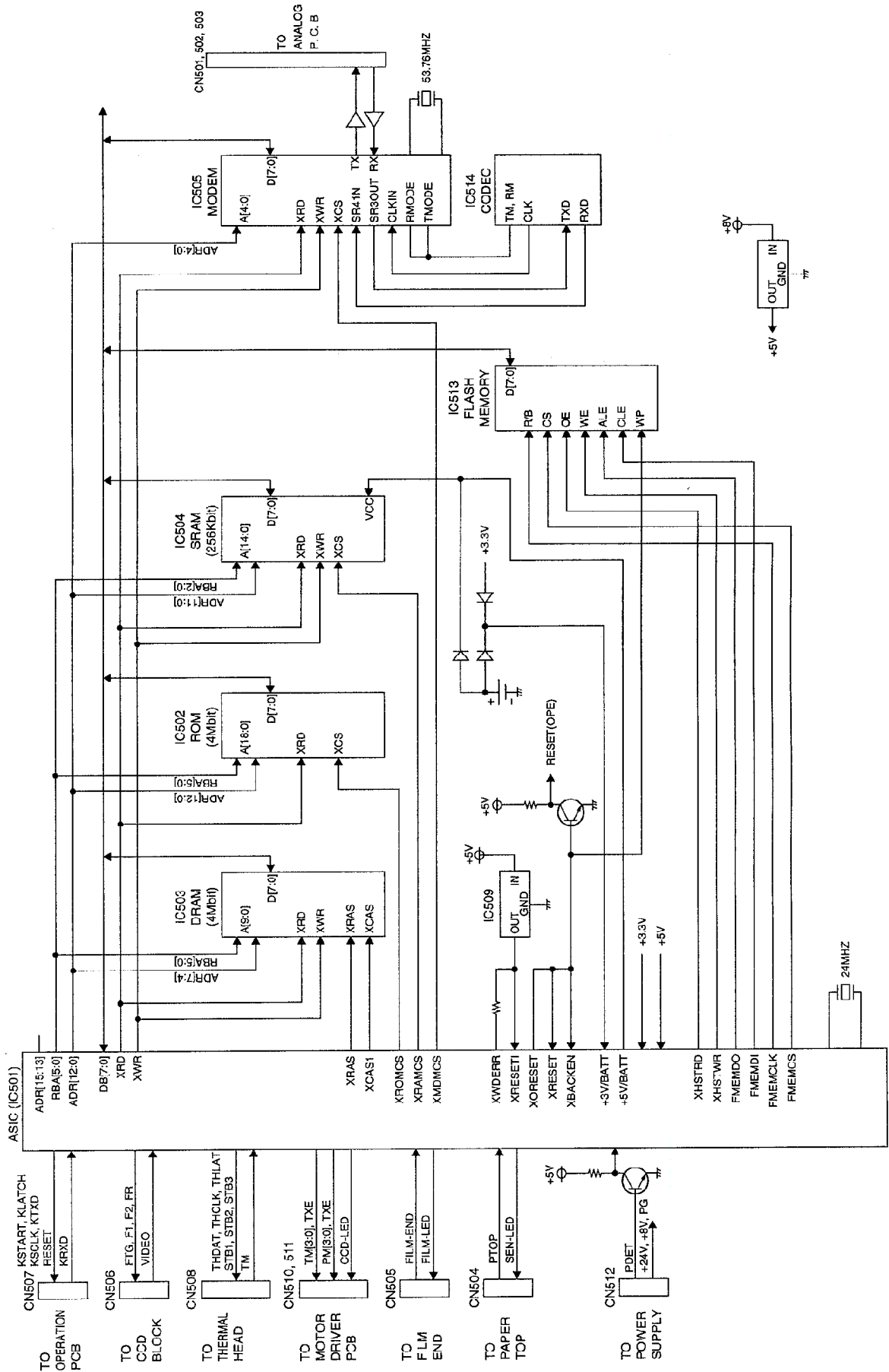
Please refer to the Block diagram.

The ASIC (IC501) controls all the other digital ICs. When the power is turned on, the ASIC retrieves the operation code stored in the ROM (IC502), then follows the instructions for controlling each IC. All ICs have some inner registers that are assigned to a certain address.

It is the address bus by which the ASIC designates the location inside each IC. And the data bus reads or writes the data in order to transmit the instructions from the ASIC to the ICs.

These signal lines are all controlled by voltages of 5V (H) or 0V (L).

Digital Block Diagram



The signal lines that must be normal for the system to boot up are listed here [List 1].
For signal lines other than these, even if they malfunction, they do not directly affect booting up the system.

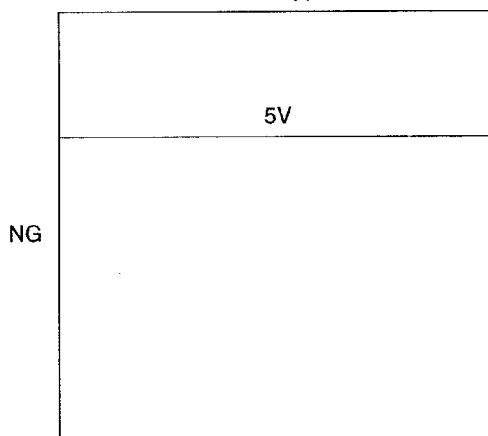
[List 1]

- | | |
|----------------------|-------------------------------------|
| ① D0~D7 | (Data Bus) |
| ② A0~A15 | (Address Bus) |
| ③ \overline{RD} | (Read Signal) |
| \overline{ROMCS} | (ROM Select Signal) |
| \overline{WR} | (Write Signal) |
| \overline{RAMCS} | (SRAM Select Signal) |
| ④ RBA0~RBA5 | (Bank Address Signal) |
| ⑤ \overline{RAS} | (DRAM Row Address Strobe Signal) |
| \overline{CAS} | (DRAM Column Address Strobe Signal) |
| ⑥ \overline{MDMCS} | (Modem Select Signal) |

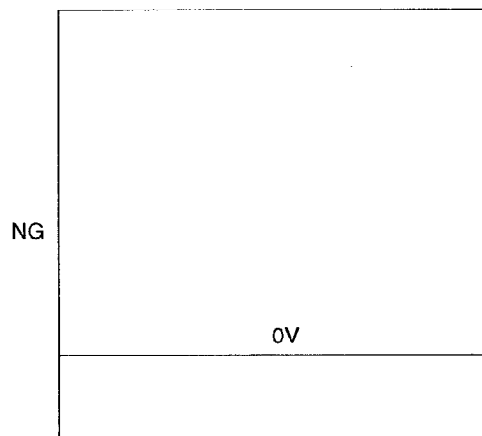
If these signals are normal, once the power is turned on, each IC repeatedly outputs 5V (H) and 0V (L). The following page shows NG and normal wave patterns.

NG Wave pattern (Refer to page 76)

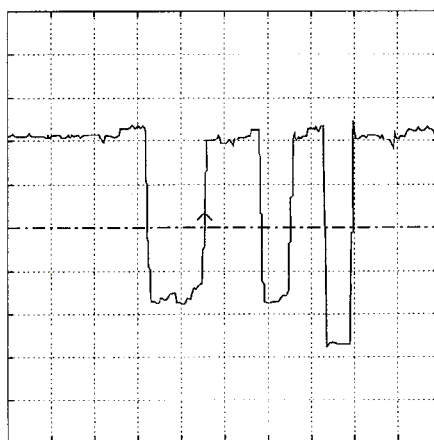
0V never appears.



5V never appears.

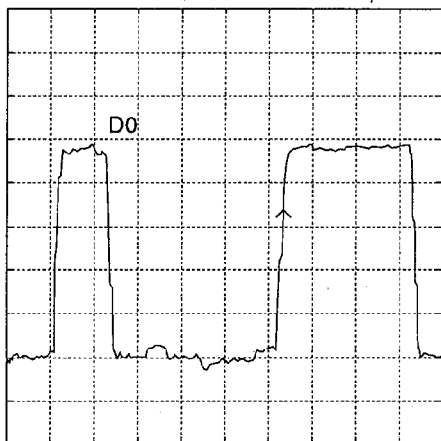


For a short between D0 and D1
500ns/div, 1V/div

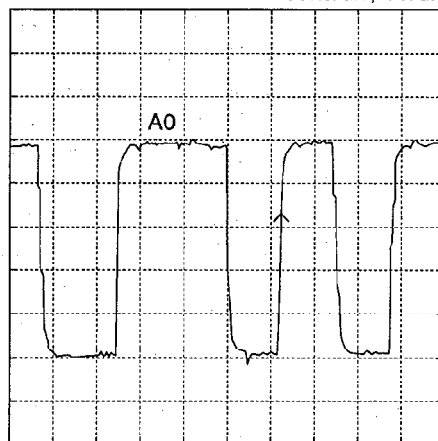


Normal Wave Patterns

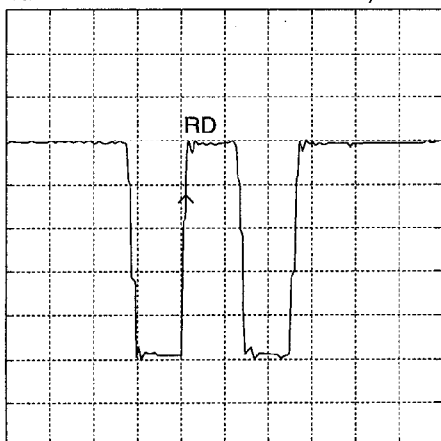
① D0~D7 200ns/div, 1V/div



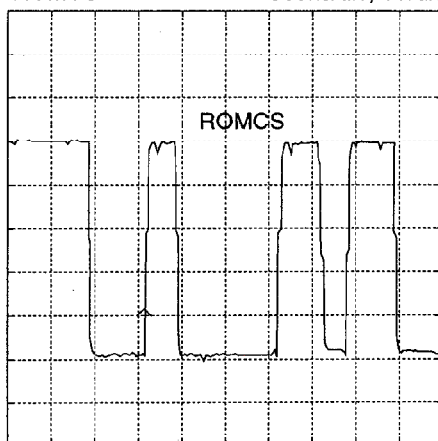
② A0~A5 200ns/div, 1V/div



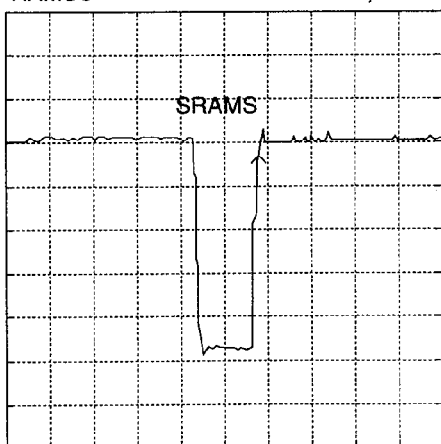
③ $\overline{\text{RD}}$ 100ns/div, 1V/div



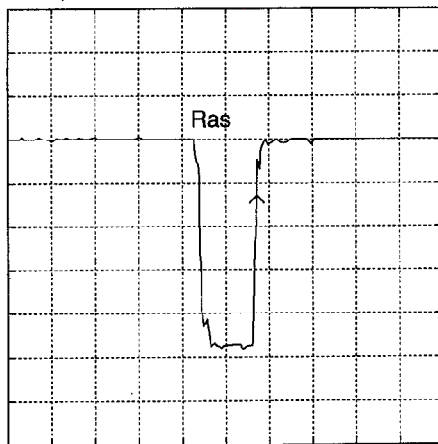
④ ROMCS 500ns/div, 1V/div



⑤ RAMSC 500ns/div, 1V/div



⑥ RAS, CAS 100ns/div, 1V/div



For these reasons and the software sequence to boot up the unit, if you use an oscilloscope to judge whether a signal is OK or NG, you must check in the same order as in [List 1]. (If the ASIC failed to access the ROM, the ASIC cannot access SRAM or DRAM normally.)

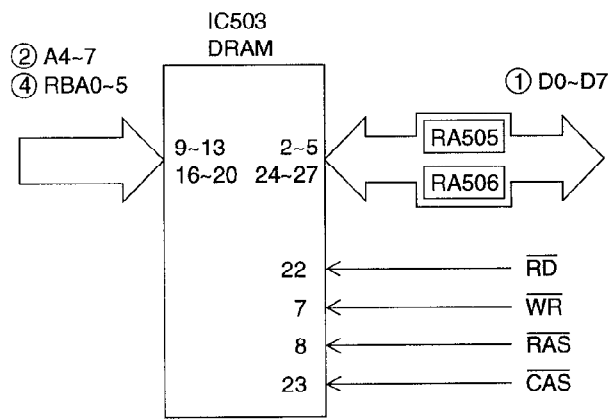
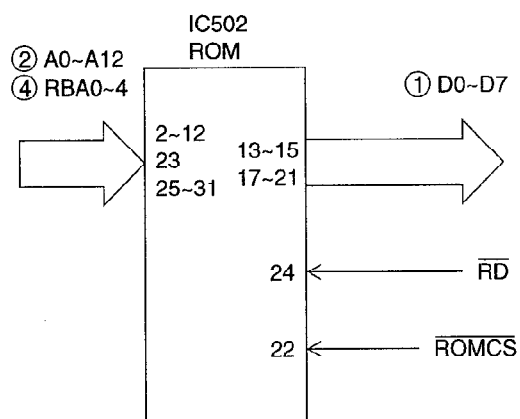
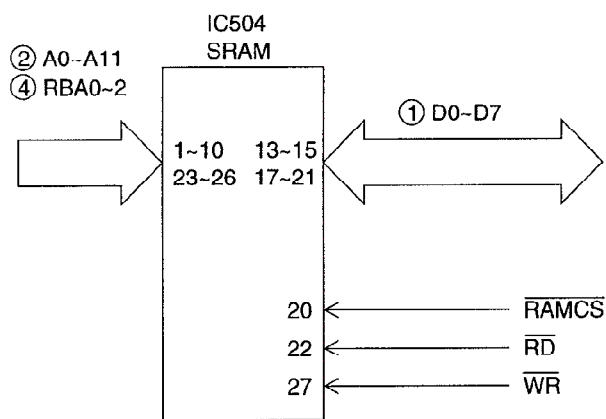
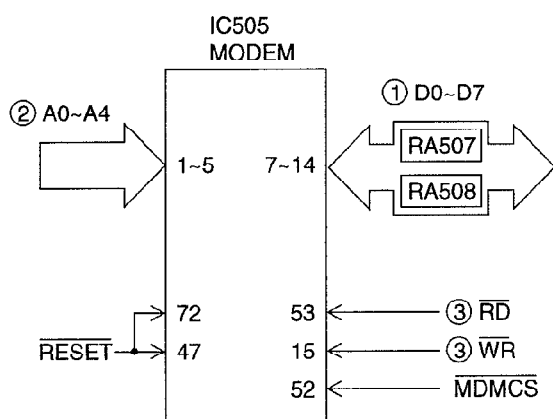
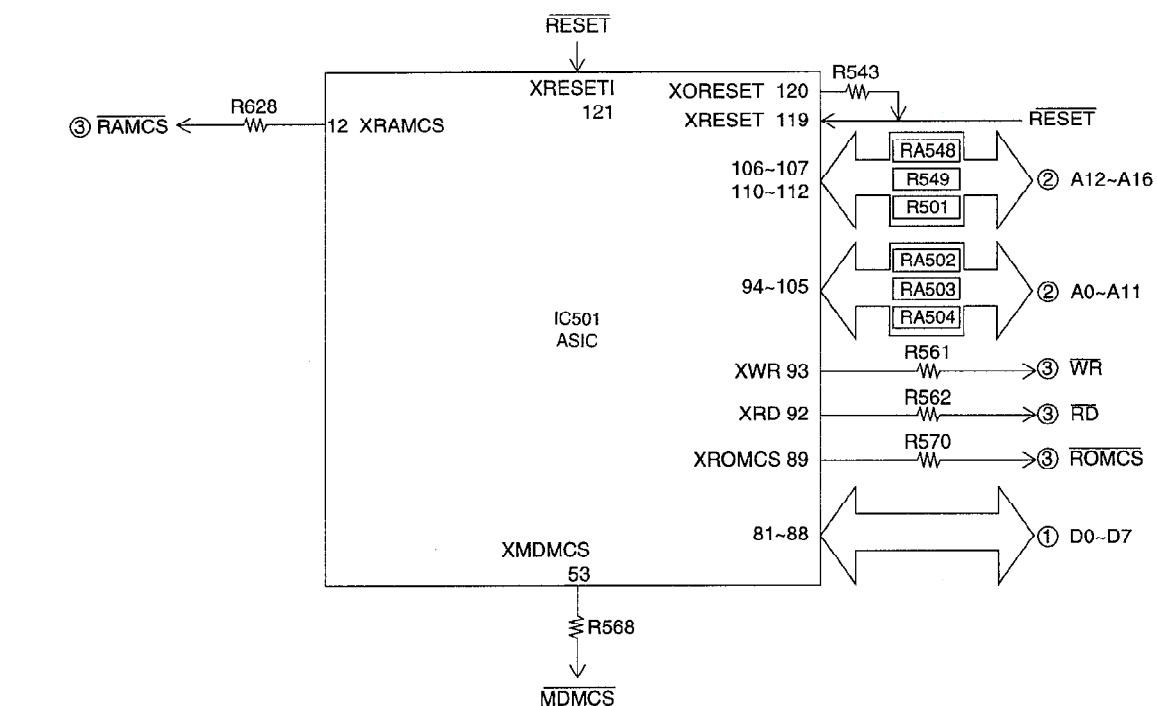
The digital circuit actually operates according to the timing combinations of these signals. So, if the timing of these signals is even slightly off, the circuit will not operate normally. Even if the IC did malfunction, the output voltage level may become abnormal but the timing is accurate according to the specifications. (If oscillation is provided accurately.)

Accordingly, the problem presented here is whether each IC outputs the correct signal. (See the I/O direction diagram on the next page.) In other words, is it constantly switching between 5V (H) and 0V (L) as described earlier.

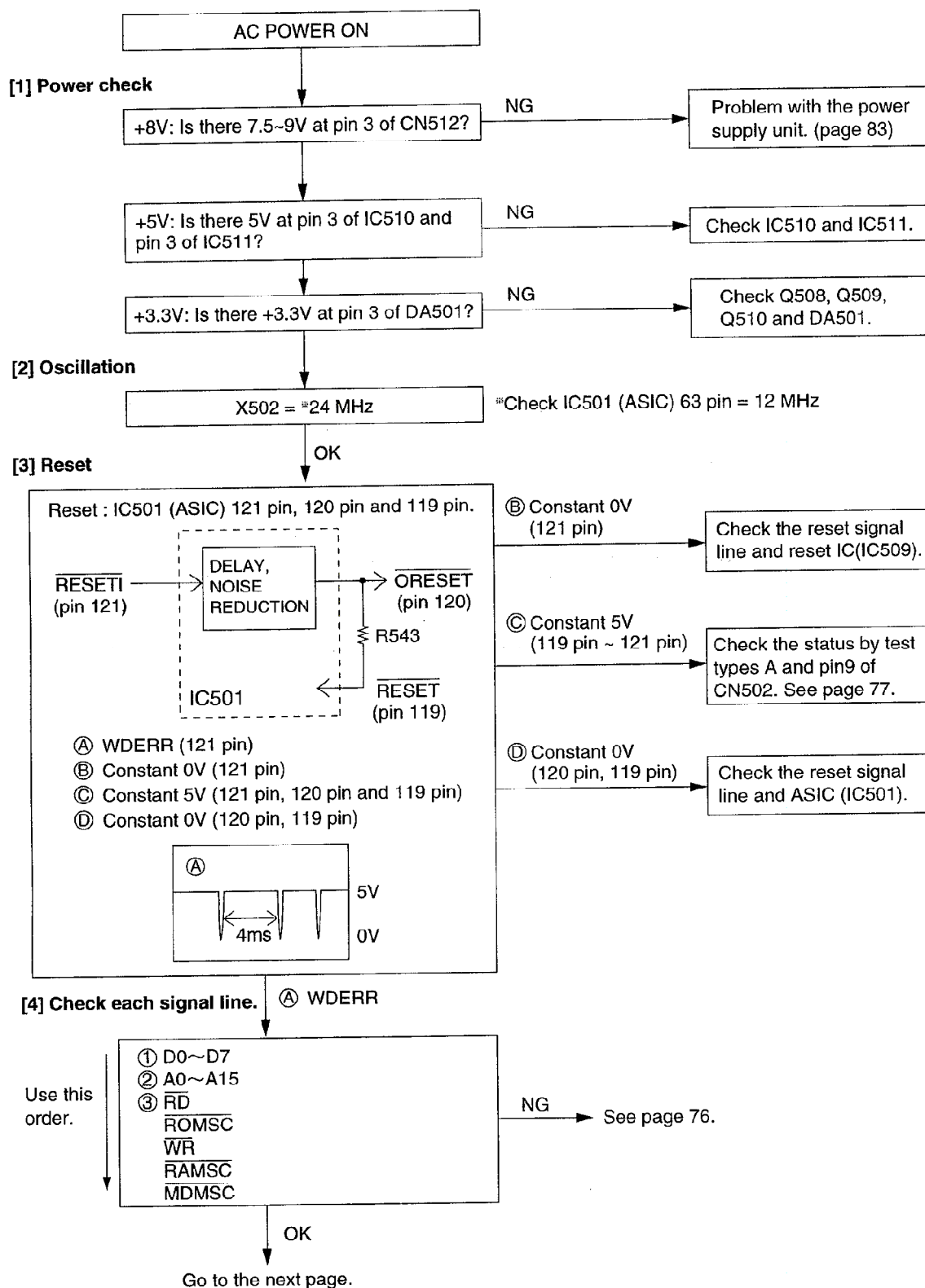
All you have to do is check that the IC repeatedly outputs (H) 5V and (L) 0V.

KX-FP270

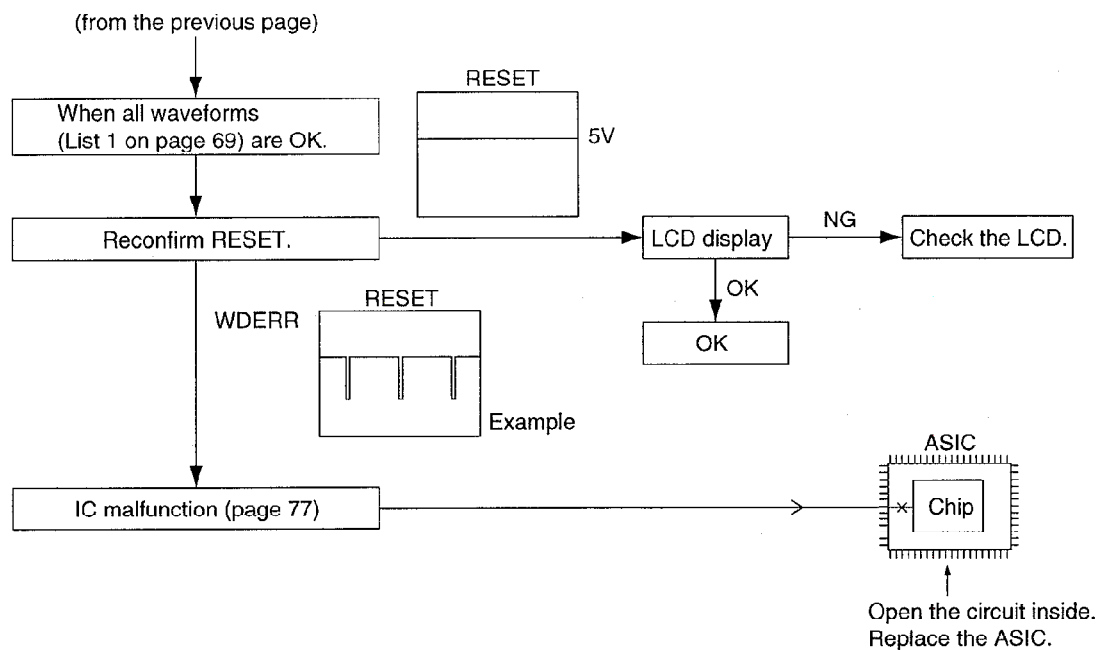
I/O and Pin No. Diagram



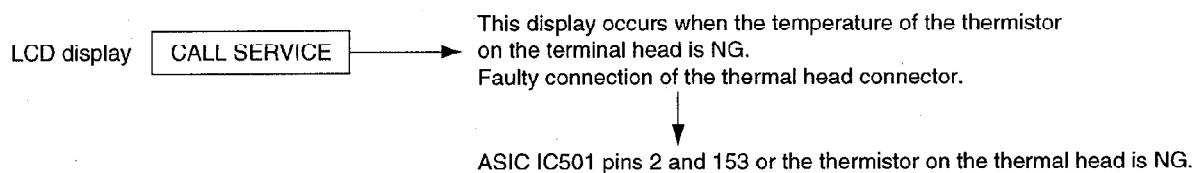
After the power is turned on, the ASIC initializes and checks each IC.
The ROM, SRAM, and modem are checked.
If initialization fails for the ICs, the system will not boot up.
In this case, please find the cause as follows.



KX-FP270

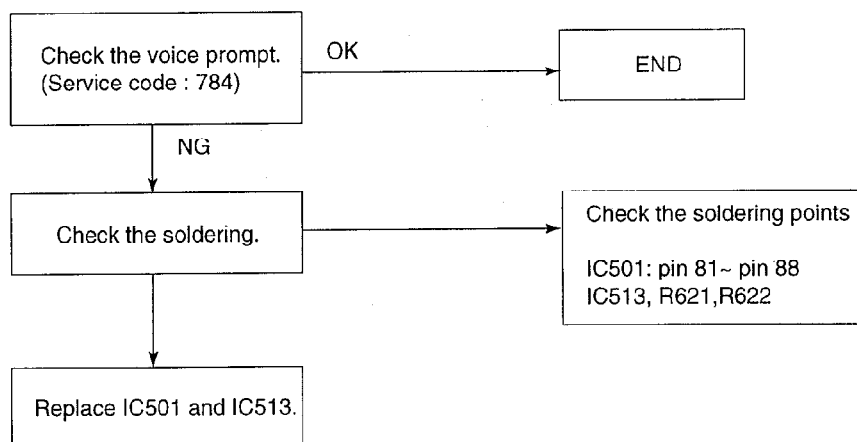


Other NG examples while the power is ON and the LCD displays the following.



FLASH MEMORY (IC513)

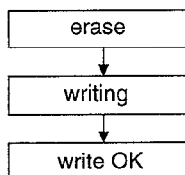
If the unit is working correctly but the VOICE GUIDANCE (voice prompt) is not heard, you should check the Flash Memory.



A voice message is pre-recorded in the Flash Memory (IC513). So, when you find an IC513 malfunction and exchange it with a new one. You have to pre-record the voice message by using a special ROM. How to use the special ROM (Voice Message Recording ROM)

1. Turn the AC power OFF.
2. Exchange the regular system ROM with the special ROM.
3. Turn the AC power ON.
4. The Voice Message Recording starts automatically.

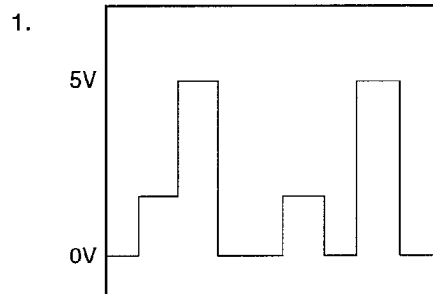
LCD changes



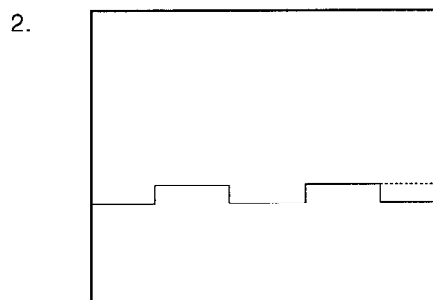
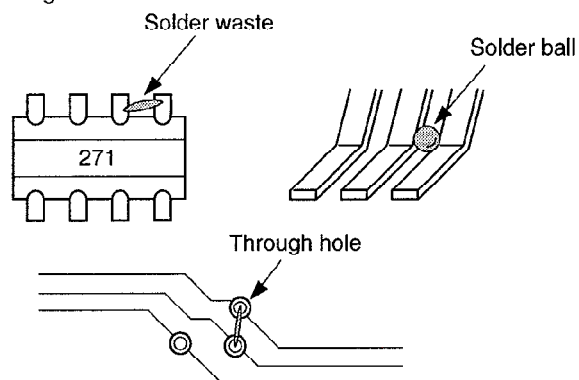
5. Turn the AC power OFF.
6. Exchange the special ROM with the regular system ROM.

KX-FP270

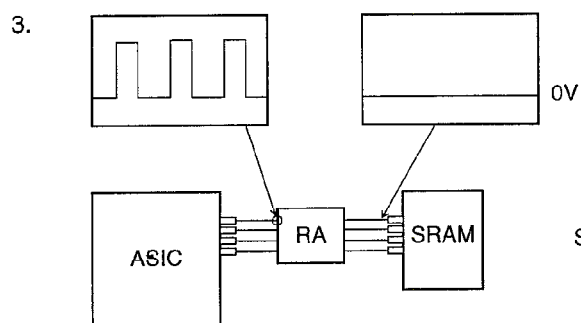
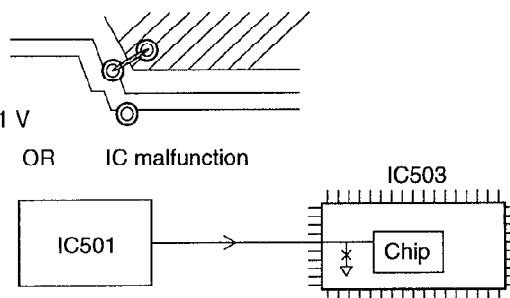
NG Example



Short circuit from the adjacent signal wires.
Check for a short circuit in the RA and IC leads and the signal wire at the through hole.

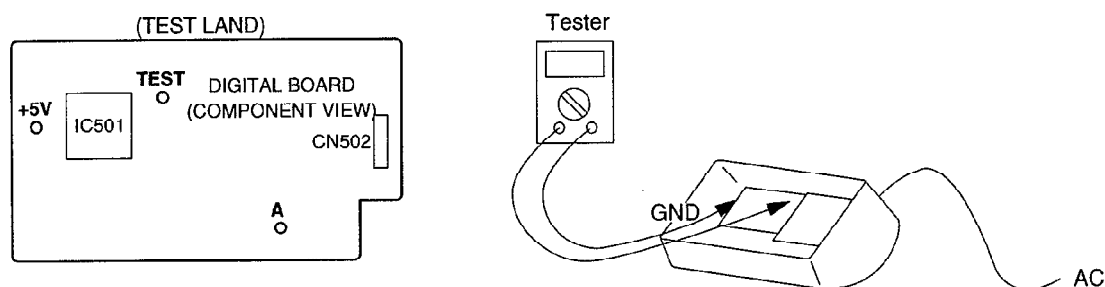


Short between the signal line and GND.



Solder fault on RA.

Please check the status (voltage) of test lands A, B and C.
These statuses may tell you a defective point.



- Turn off the power supply.
- Short using a metallic object, such as tweezers, between the test and +5V land, and turn on the AC power for few seconds. And then remove a metallic object.
- Check the following voltages using an oscilloscope or tester.
- To cancel the status check mode, turn off the AC power.

Defective point	Check point voltage		Check items
	A	CN502 9 pin	
RTC (IC501)	0V	0V	IC501(RTC is included in IC501)
DRAM (IC503)	0V	5V	IC503(8,23 pin), R566, R567, RA506, RA505, L523, C562, C565, IC501(78, 79 pin)
MODEM (IC505)	5V	0V	IC501(72 pin), IC505(15, 52, 53 pin), R591, R599, C595, C597, C598, L525, L524, RA508, RA507
ALL OK	5V	5V	

•This indicates that the Add/Data Bus, RAM, ROM, MODEM, and ASIC are all connected to the ASIC properly and that control from the ASIC is possible.

Please check the soldering and conduction of these components.
If there is no problem, replace the ICs.

If you still have a problem with the digital board, please refer to page 69.

•To cancel the status check mode, turn off the AC power.

KX-FP270

3.3.5 Analog Board Section

The analog parts check is actually different than the digital parts check. The signal route is determined by the purpose of the check. For example, the handset TX route begins from the handset microphone and is output in the telephone line. In this route, it is mainly an analog signal. Tracing the signal can be done easily using an oscilloscope. Each route is shown on the Check Sheet here. If there is a problem with the unit (for example, you cannot communicate with the H/S, etc.), trace the signal in the area and determine the cause.

CHECK SHEET

(SYMPTOM) CHECK ITEMS		IN	Signal	ROUTE	OUT
SP-PHONE Tx				MIC-CN104(1)-C189-R189-IC103(12-44)-CN101(9)- {CN501(9)-C615-R606-R683-IC514(23-6)-IC505(82-28, 29) } C605-R607 IC515(5, 6-7)-CN501(8)} -CN101(8)-C135-R150-IC103(48-31)-C132-R147- C606-R608 IC104(6-7)-C152-R163-T101-TEL LINE	
SP-PHONE Rx				TEL LINE-T101-R144-C138-IC104(2-1)-C126-C184-R188-IC103(29-35)-C118-R129-IC101(9-8)-C102-CN101(7)- {CN501(7)-R617-IC515(2-1)-C611-R603-R629-IC505(38-83)-IC514(13-17, 18) } C601-R604 C602-R605 IC516(5, 6-7)-R615-CN501(10)} -CN101(10)-C134-R149-IC103(46-53)-R165-C153-IC103(54-56)-C106-R116-IC102(4-5, 8)-L110, L111-CN105(1, 2)-SPEAKER	
HANDSET Tx				HANDSET MIC CN107(4)-L104-R217-C211 IC103(21, 22-31)-C132-R147-IC104(6-7)-C152- CN107(1)-L101-R218-C212 R163-T101-TEL LINE	
HANDSET Rx				TEL LINE-T101-R144-C138-IC104(2-1)-C126-C184-R188-IC103(29-15, 16) L103 C214-L102 CN107(2, 3)- HANDSET SPEAKER	
DTMF Monitor	Speaker			{IC514(17, 18) C601-R604 IC516(5, 6-7)-R615-CN501(10)}-CN101(10)-C134-R149-IC103(46-53)- C602-R605 R165-C153-IC103(54-56)-C106-R116-IC102(4-5, 8)-L110-L111-CN105(1, 2)-SPEAKER	
	Handset			{IC505(28, 29) C605-R607 IC515(5, 6-7)-CN501(8)}-CN101(8)-C136-R151-IC103(49-15, 16) C606-R608 L103 CN107(2, 3)-HANDSET SPEAKER C214-L102	
CNG detection				TEL LINE-T101-R144-C138-IC104(2-1)-C126-R114-C105-IC101(1-2)-C102-CN101(7)-{CN501(7)-R617-IC515(2-1)-C611-R603-R629-IC505(38)}	
VOX detection				TEL LINE-T101-R144-C138-IC104(2-1)-C126-C184-R188-IC103(29-35)-C173-R180-IC103(36-38)-R173-C166-R172-IC103(40-42)-CN103(4)-{CN503(4)-IC501(18)}	
Greeting for TEL Line				{IC505(28,29) C605-R607 IC515(5, 6-7)-CN501(8)}-C135-R150-IC103(48-31)-C132-R147- C606-R608	
MSGs for TEL Line				IC104(6-7)-C152-R163-T101-TEL LINE	

Note:

{ }: Inside the digital board

(SYMPTOM) CHECK ITEMS	Signal	
	IN	ROUTE → OUT
ICM Rec	TEL LINE-T101-R144-C138-IC104(2-1)-C126-C184-R188-IC103(29-35)-C173-R180-IC103(36-38)-C123-R136-IC101(11-10)-C102-CN101(7){CN501(7)-R617-IC515(2-1)-C611-R603-R629-IC505(38)}	
Greeting/ Memo Rec	MIC-CN104(1)-C189-R189-IC103(12-35)-C173-R180-IC103(36-38)-C123-R136-IC101(11-10)-C102-CN101(7){CN501(7)-R617-IC515(2-1)-C611-R603-R629-IC505(38)}	
DTMF detection OGM Outputting	TEL LINE-T101-R144-C138-IC104(2-1)-C126-C184-R188-IC103(29-35)-C118-R129-IC101(9-8)-C102-CN101(7){CN501(7)-R617-IC515(2-1)-C611-R603-R629-IC505(38)}	
DTMF detection ICM Recording	TEL LINE-T101-R144-C138-IC104(2-1)-C126-C184-R188-IC103(29-35)-C204-IC105(1)	
DTMF for TEL Line	{IC505(28, 29) {C605-R607 C606-R608} IC515(5, 6-7)-CN501(8)}-CN101(8)-C135-R150-IC103(48-31)-C132-R147-IC104(6-7)-C152-R163-T101-TEL LINE	
FAX Tx	{IC505(28, 29) {C605-R607 C606-R608} IC515(5, 6-7)-CN501(8)}-CN101(8)-C104-R107-C103-IC101(4-3)-C131-R146-IC104(6-7)-C152-R163-T101-TEL LINE	
Beep for TEL Line	{IC501(34)-R563-CN501(11)}-CN101(11)-C137-R152-IC103(49-31)-C132-R147-IC104(6-7)-C152-R163-T101-TEL LINE	
Dummy Ring Back Tone	{IC501(34)-R563-CN501(11)}-CN101(11)-C137-R152-IC103(49-31)-C132-R147-IC104(6-7)-C152-R163-T101-TEL LINE	
Ringing/ Alarm / Beep / Key Tone	{IC501(34)-R563-CN501(11)}-CN101(11)-C142-R156-IC103(52-53)-R165-C153-IC103(54-56)-C106-R116-IC102(4-5, 8)-L110,L111-CN105(1, 2)-SPEAKER	
FAX Rx	TEL LINE-T101-R144-C138-IC104(2-1)-C126-R114-C105-IC101(1-2)-C102-CN101(7){CN501(7)-R617-IC515(2-1)-C611-R603-R629-IC505(38)}	

Note:

{ }: Inside the digital board

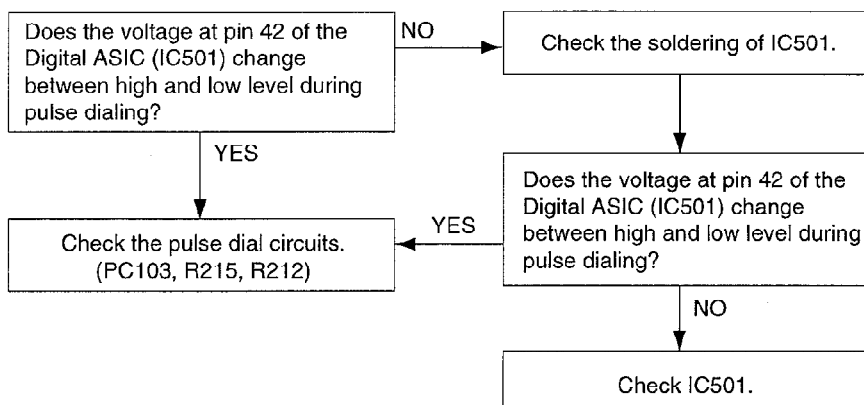
KX-FP270

1) Defective ITS (Integrated Telephone System) Section

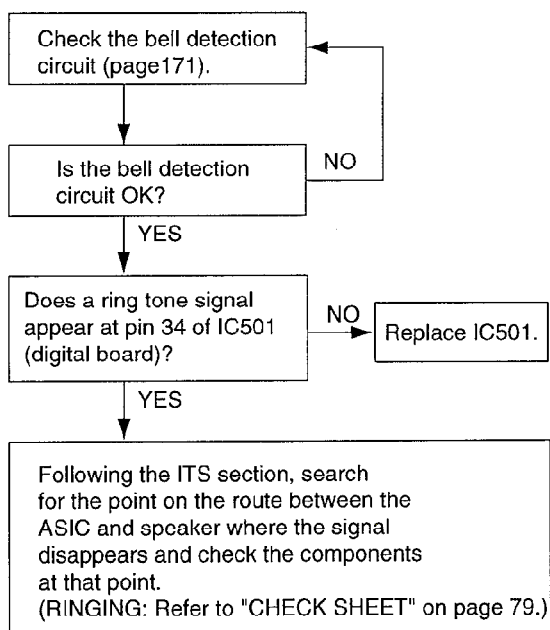
① No handset and speakerphone transmission / reception

Following the ITS section or NCU section, search for the route between the handset microphone and telephone line (sending), or between the telephone line and the handset speaker (receiving), or between the microphone and the telephone line (sending), or between the telephone line and the speaker (receiving) where the signal disappears using the "CHECK SHEET" on pages 78 and 79. Check the components at that point.

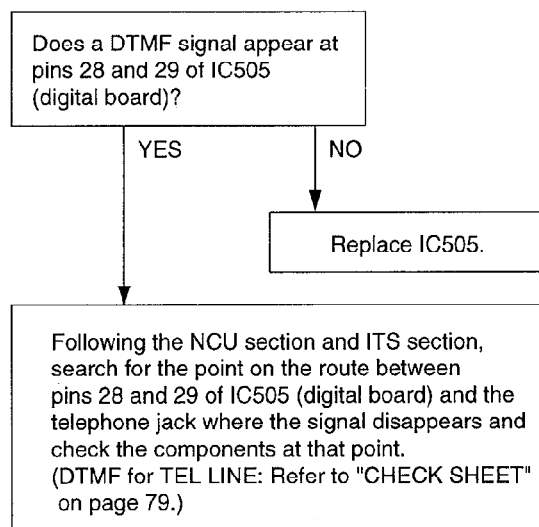
② No pulse dialing



③ No ring tone (or No bell)



④ No tone dialing

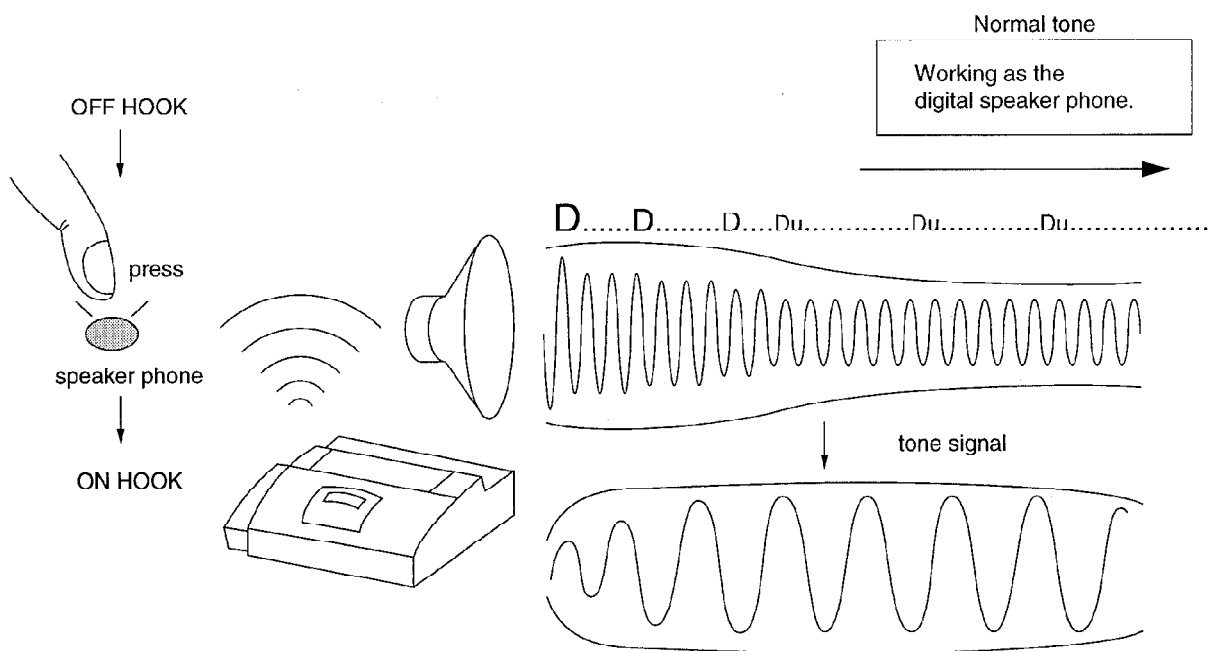


3.3.6. Digital speakerphone section

The digital speaker phone is different from the analog speaker phone.

The previous type (analog speaker phone) switches between Tx or Rx. Either Tx or Rx is able to pass through a telephone line or speaker, depending on the Tx and Rx signal (voice) level. The larger one can pass through the route for that signal. Therefore, you never hear the other party's voice while you are talking. But with the digital speaker phone feature, you can hear the other party's voice while you are talking. So both Tx and Rx are active at the same time. Troubleshooting is also different from the previous type.

At the start of communication, for the initial 2~3 exchanges the digital speakerphone performs half-duplex operation, alternating between transmission (Tx) and reception (Rx). Then duplex communication becomes possible. Learning occurs during the initial 2~3 exchanges of communication in order to set the appropriate parameters for duplex communication.



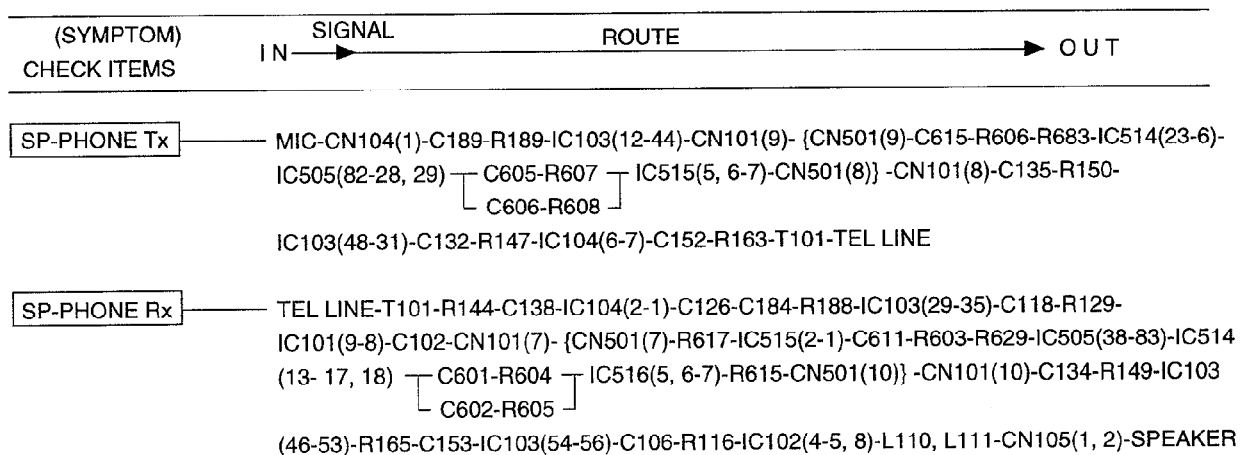
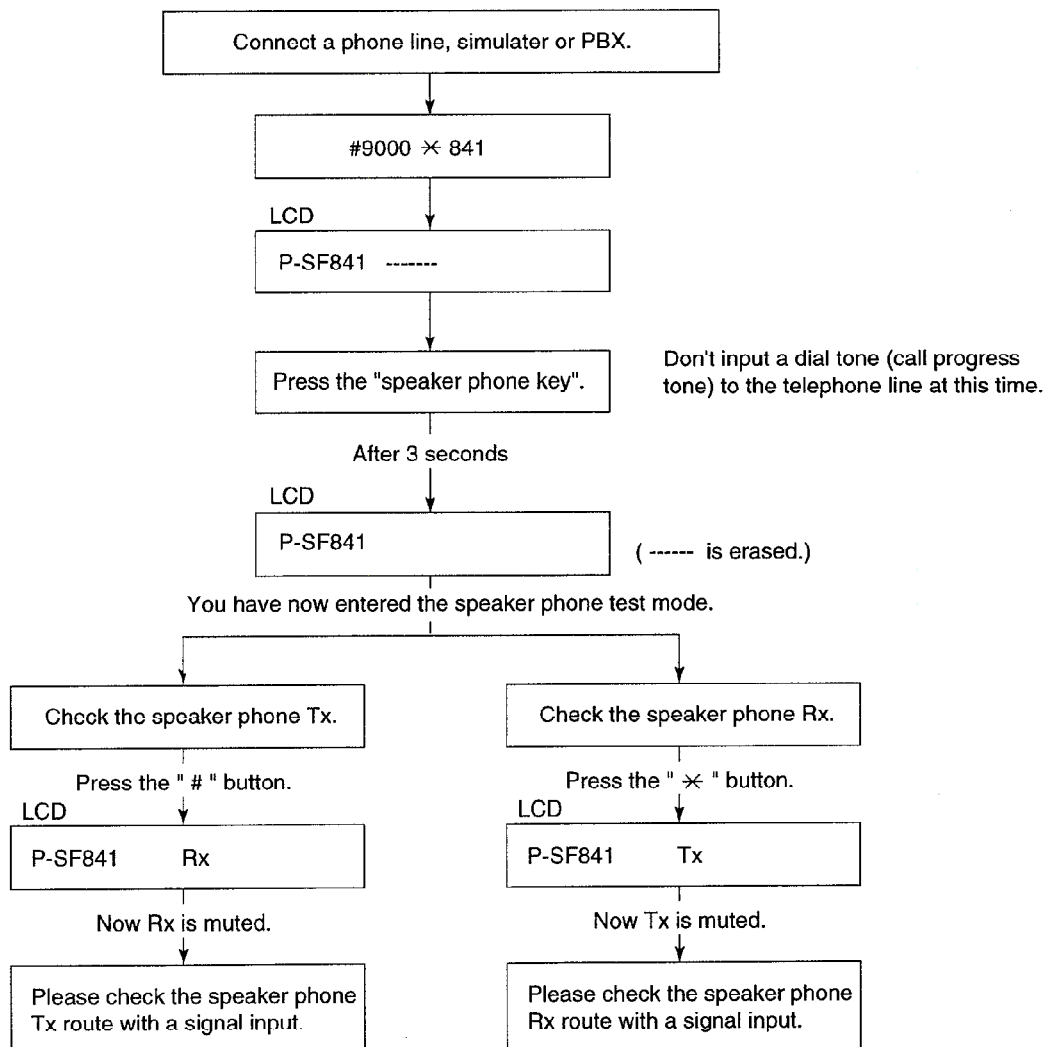
You cannot check the digital speaker phone by the previous method (signal route) because the level is changing as stated above.

Therefore, there is a service function for this troubleshooting. In this service mode, you can set the mute to either Tx or Rx. Then you can check the signal route of the speaker phone Tx or speaker phone Rx without any disturbances.

KX-FP270

HOW TO USE THE **841** SERVICE FUNCTION for THE DIGITAL SPEAKER PHONE

Please check by using the service function #9000 ✕ **841**.



Note:

{ }: Inside the digital board

3.3.7 Power Supply Board Section

(1) Key components for troubleshooting

The following components have been known to break frequently :

F101, D101-D104, C106, Q101, PC101, IC101, F201.

This comes from our experience with experimental tests. For example : power supply, lightning surge voltage test, withstanding voltage test, intentional short circuit test, etc.

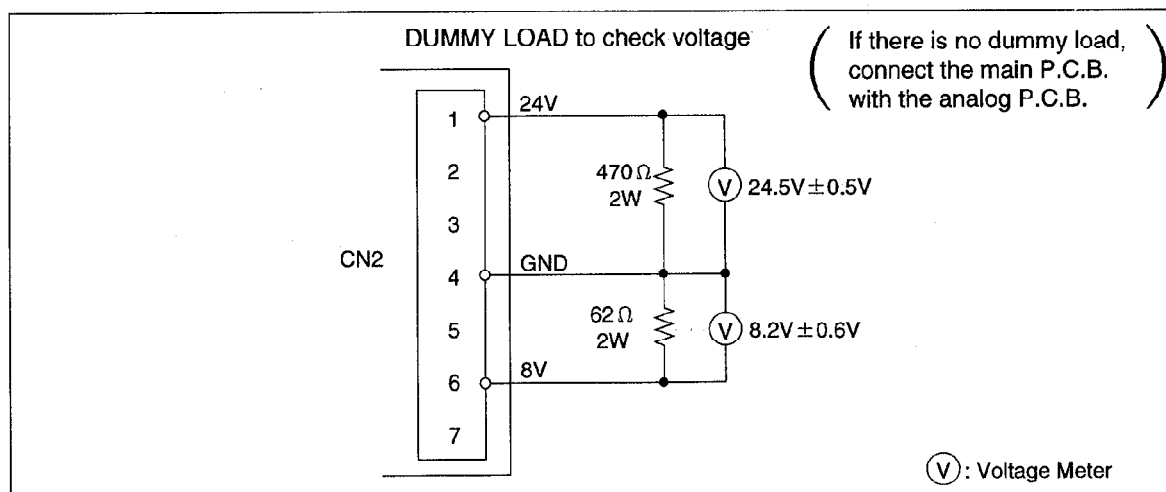
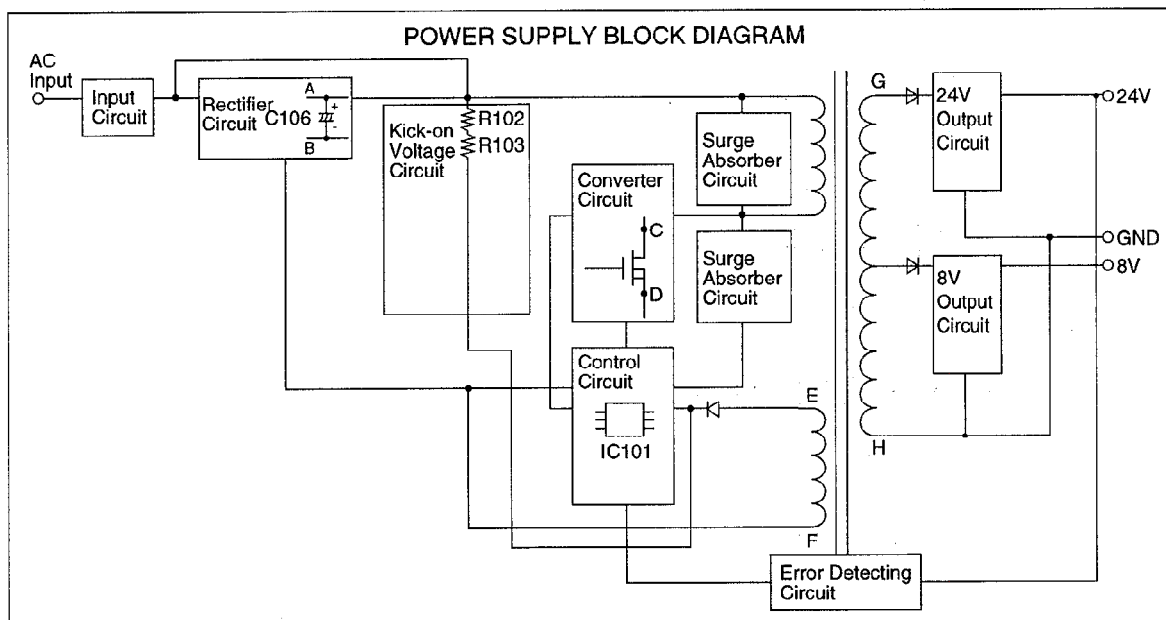
Caution:

If you find a melted fuse in the unit, don't turn the power on without repairing the unit first. (Except for the fuse.)

If you do, the fuse will melt again and the unit has not been repaired. The problem exists somewhere else.

In most cases, (our experience) the symptom is that nothing is output.

There is a high possibility in the primary side more than the secondary side.

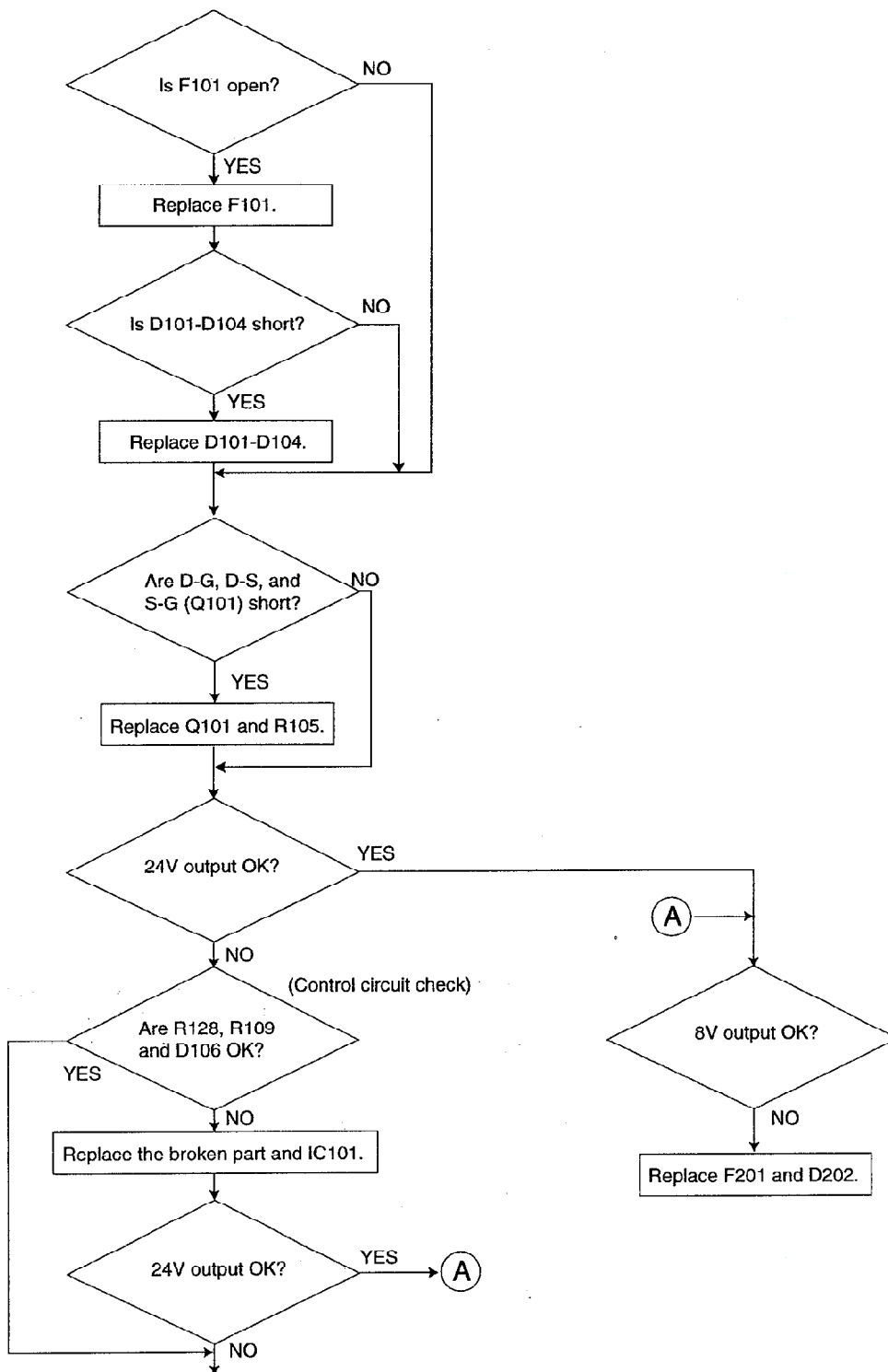


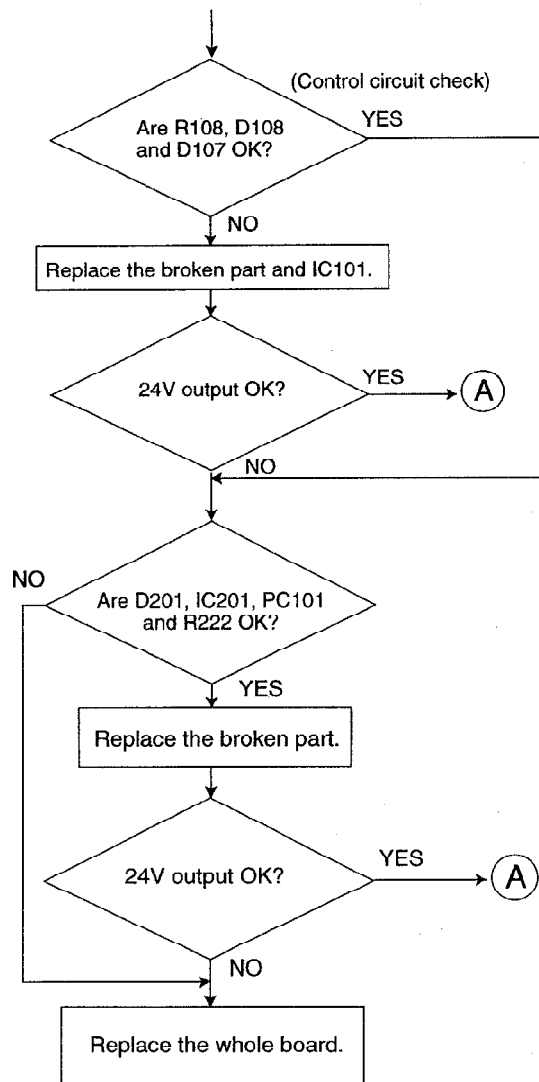
(2) Troubleshooting Flow Chart

Our recommendation for troubleshooting is as follows.

This procedure comes from our experience of troubleshooting in our lab.

※ Before turning on the power supply, you should check F101.





(3) Broken parts repair details

(D101, D102, D103, D104)

Check for a short-circuit in terminal 4. If D101, D102, D103 and D104 are short-circuited, F101 will melt (open). In this case, replace all of the parts (D101, D102, D103, D104, F101).

(Q101)

The worst case of Q101 is a short-circuit between the Drain and Gate because damage expands to the peripheral circuit of Q101.

This is due to a very high voltage through the Gate circuit which is composed of R128, R109, D106 and IC101. You should change all of the parts listed as follows.

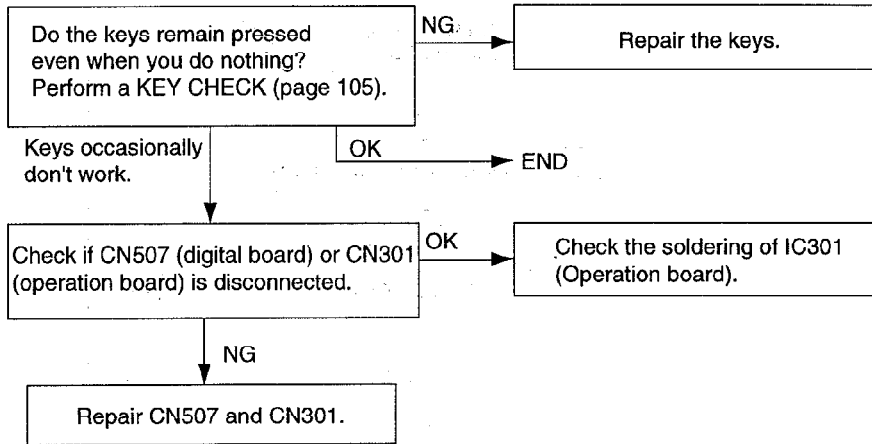
F101, Q101, R128, R109, D106, IC101

(D201)

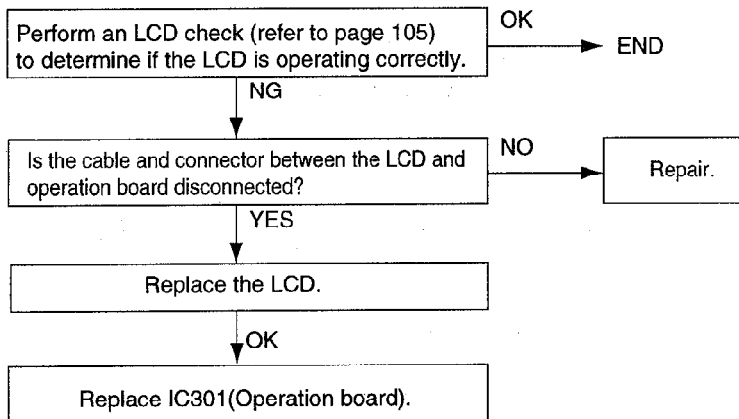
If D201 is broken, the oscillation circuit in the power supply cannot operate. Check it with an electric tester.

3.3.8 Operation Panel Section

① No key operation



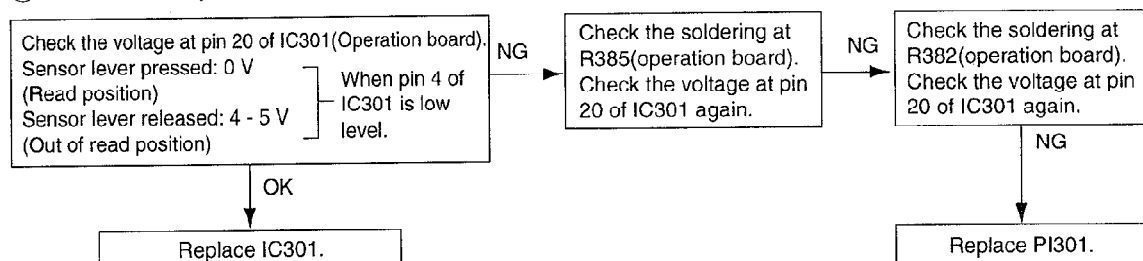
② No LCD indication



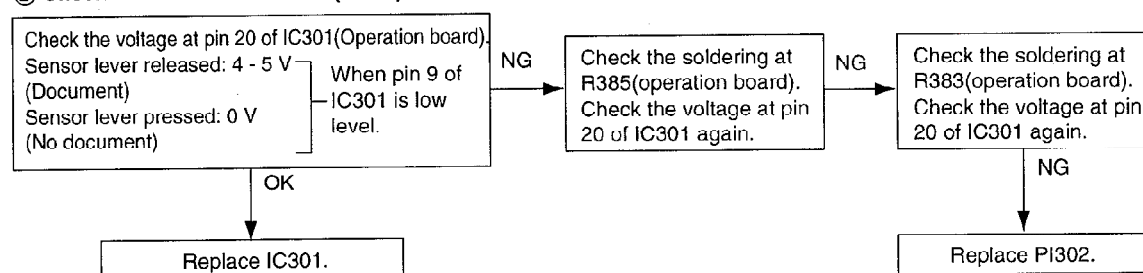
3.3.9 Sensor Board Section (Refer to pages 157 - 161 for the circuit descriptions.)

Perform an SENSOR CHECK (815: refer to page 106) to determine if the sensor is operating correctly.

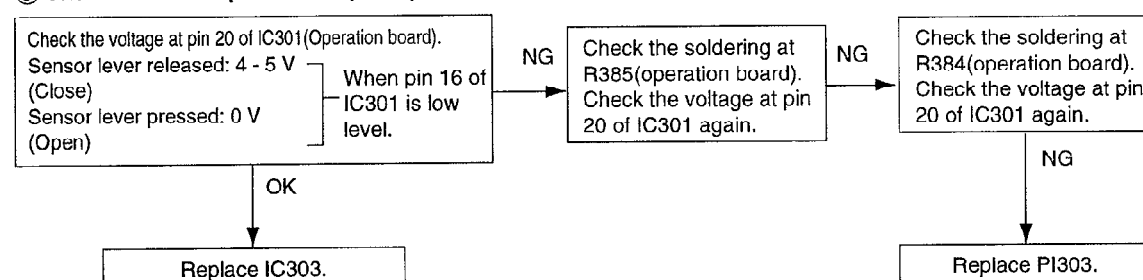
① Check the read position sensor (PI301) "REMOVE DOCUMENT"



② Check the document sensor (PI302) "CHECK DOCUMENT"

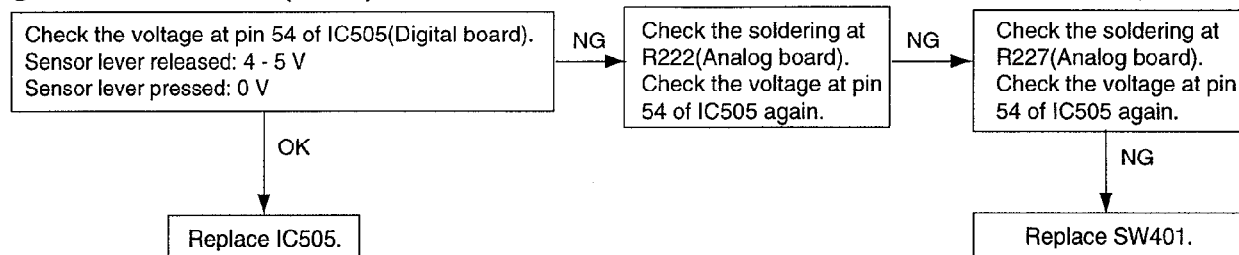


③ Check the cover open sensor (PI303) "CHECK COVER"

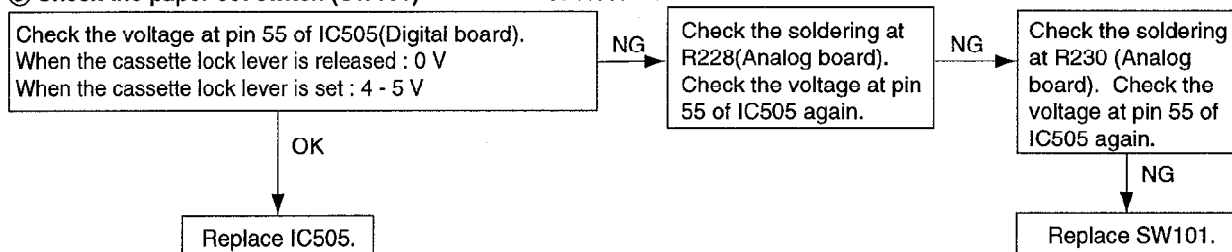


KX-FP270

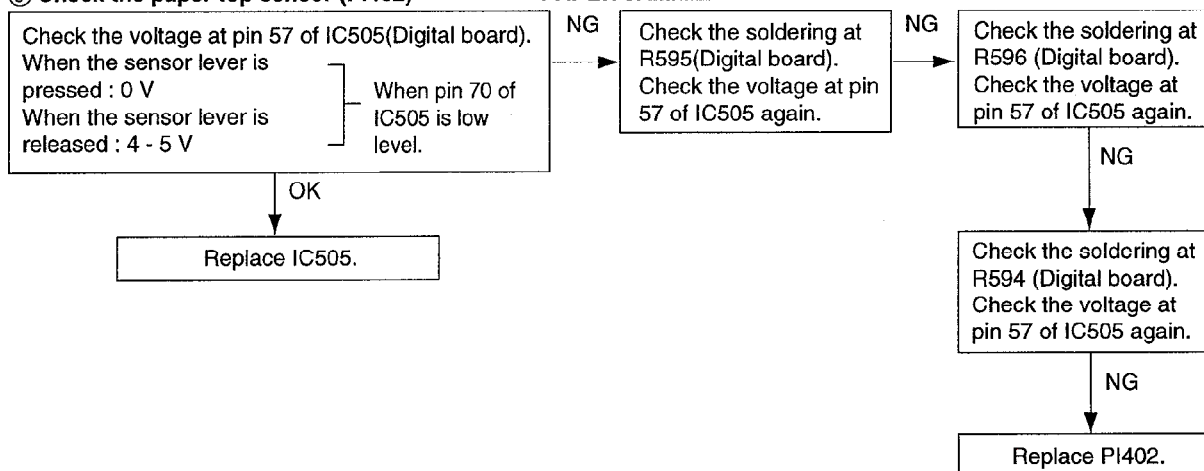
④ Check the hook switch (SW401)



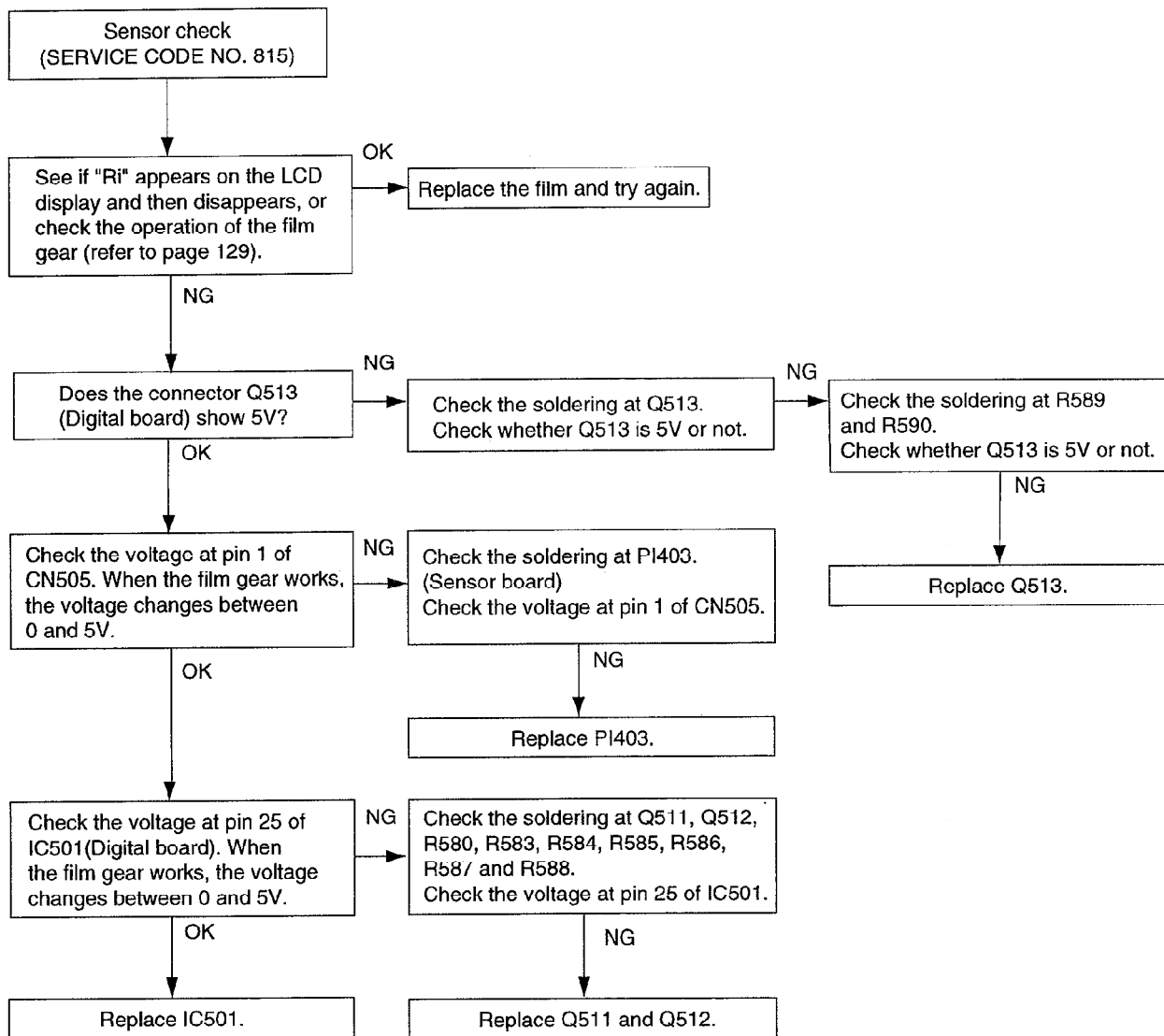
⑤ Check the paper set switch (SW101) "CHECK LEVER"



⑥ Check the paper top sensor (PI402) "PAPER JAMMED"



⑦ Check the film end sensor (PI403) "FILM EMPTY"



KX-FP270

3.3.10 CCD Board Section

Refer to pages 153 for circuit descriptions.

****The CCD BOARD installed on the CCD UNIT is adjusted precisely in our production line.
Therefore, if the CCD board is reinstalled while making repairs, it must be readjusted after troubleshooting.
(Refer to page 114.)**

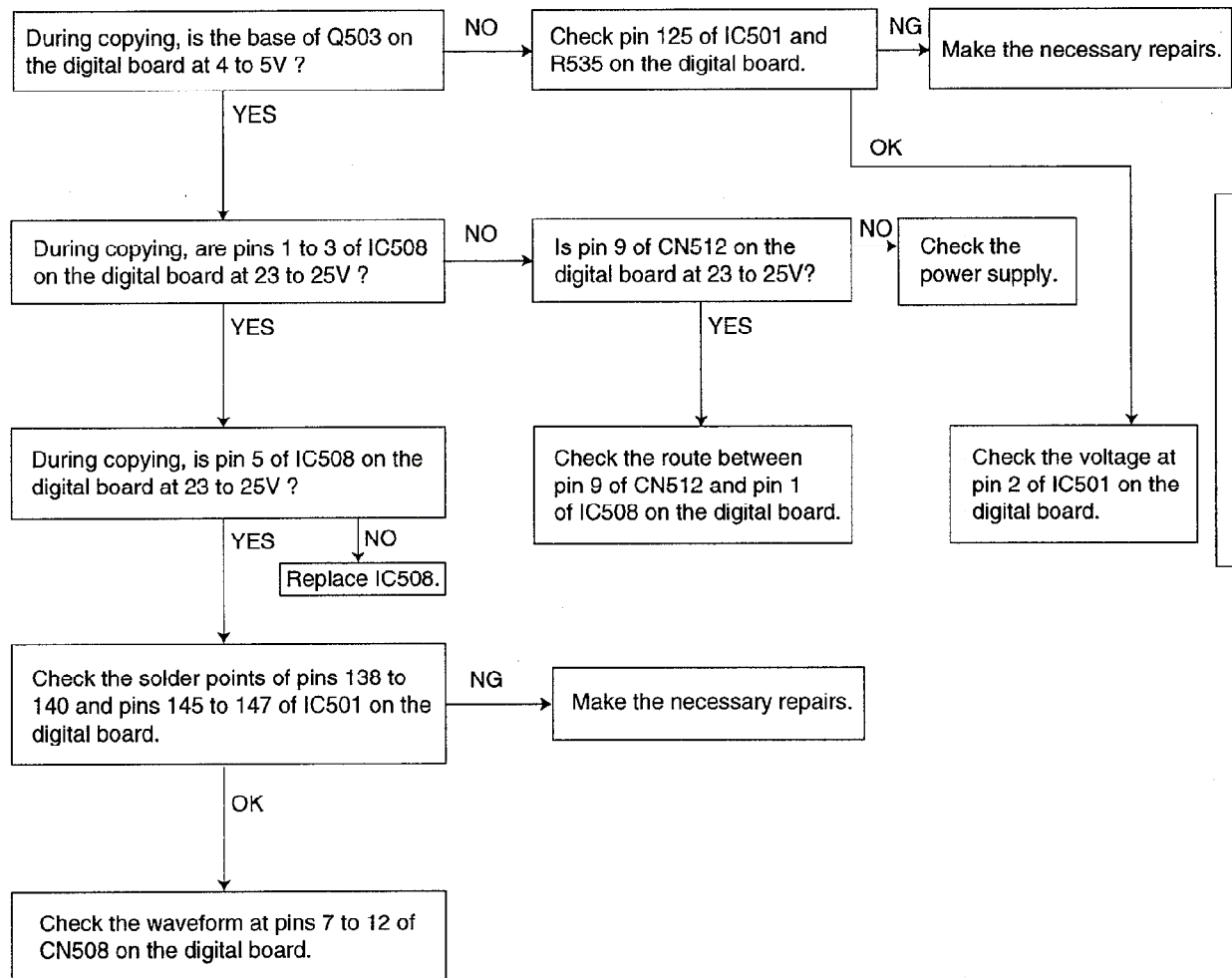
If the printout is correct while receiving test printing but incorrect while copying, the read section may be broken.
This is caused by the CCD UNIT or ASIC (IC501) [Digital board].
First, perform a SCAN CHECK to determine if the LED array lights. (Refer to page 105.)

CONDITION	CAUSE	REMEDY
IC501 outputs the signal for the CCD UNIT correctly. But the CCD UNIT doesn't output an analog image signal.	The CCD board is broken.	Replace the CCD board.
IC501 outputs the signal for the CCD UNIT correctly. But the CCD UNIT outputs an analog image signal correctly.	An analog part in the ASIC is broken.	Replace IC501.
IC501 doesn't output the signal for the CCD UNIT correctly.	A logic part in the ASIC is broken.	Replace IC501.

Note: Refer to pages 153 for the timing descriptions.

(Check the connection between
IC501 and the CCD board.)

3.3.11 Thermal Head Section (Refer to page 151 for the thermal head circuit.)



TROUBLESHOOTING GUIDE

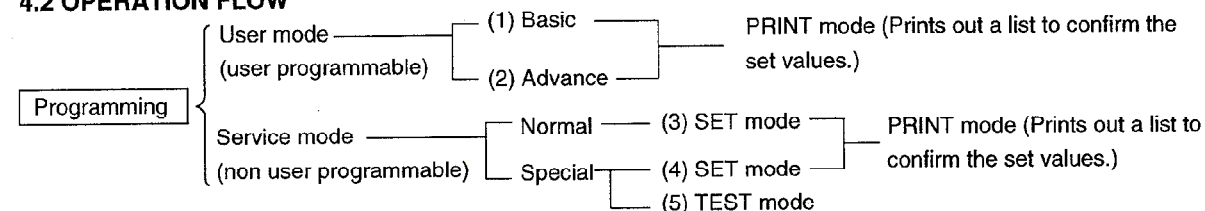
4. PROGRAMMING AND LISTS

The programming functions are used to program the various features and functions of the unit, and to test the unit. This facilitates communication between the user and the service man while programming the unit.

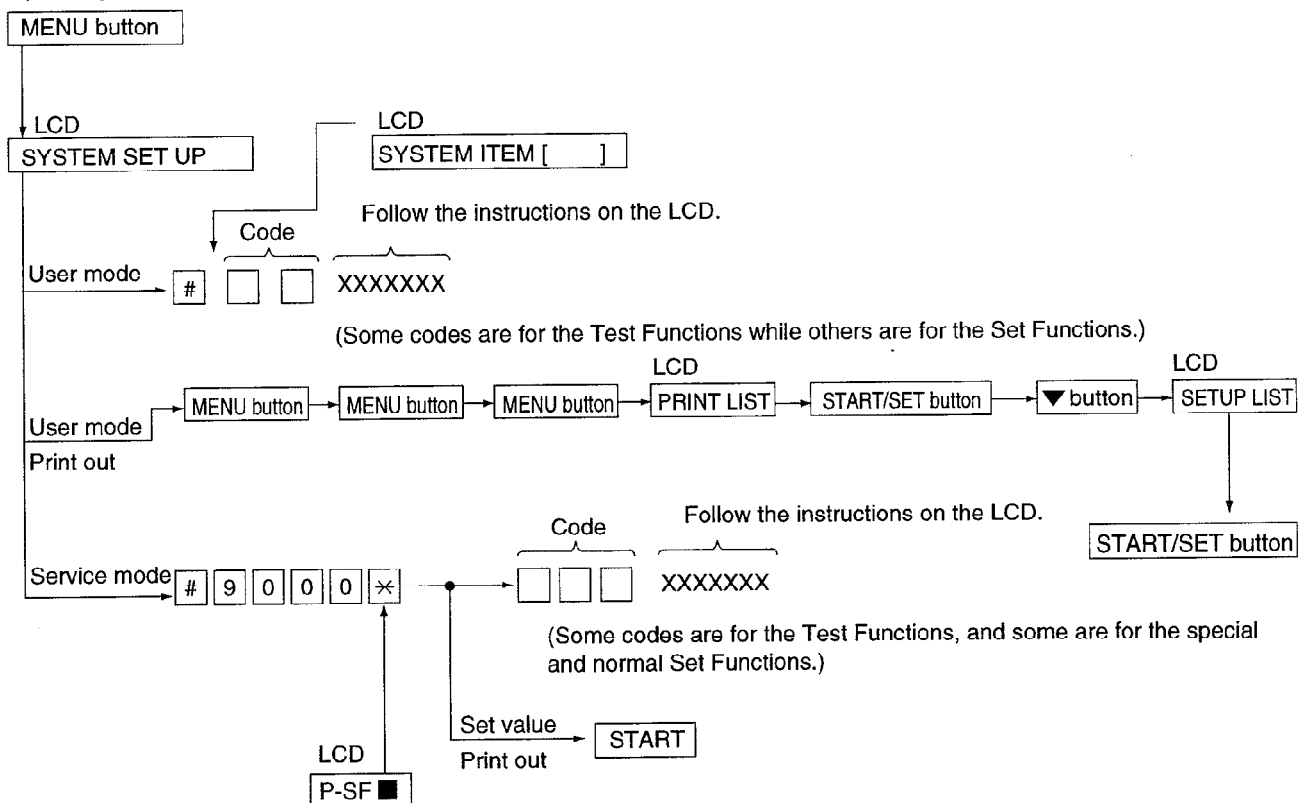
4.1 OPERATION

There are 2 basic categories of programming functions, the User Mode and the Service Mode. The Service Mode is further broken down into the normal and special programs. The normal programs are those listed in the Operating Instructions and available to the user. The special programs are those only listed here and not displayed to the user. In both the User and Service Modes, there are Set Functions and Test Functions. The Set Functions are used to program various features and functions, and the Test Functions are used to test various functions . The Set Functions are accessed by entering their code, changing the appropriate value, then pressing the SET key. The Test Functions are accessed by entering their code and pressing the key listed on the menu. While programming, to cancel any entry, press the STOP key.

4.2 OPERATION FLOW



Operating Procedure



4.3 USER MODE (The list below is an example of the SYSTEM SETUP LIST the unit prints out.)

SETUP LIST

[BASIC FEATURE LIST]

NO.	FEATURE	CURRENT SETTING
#01	SET DATE & TIME	Jan. 01 1998 12:06AM
#02	YOUR LOGO	
#03	YOUR FAX NUMBER	
#04	PRINT SENDING REPORT	ERROR [ERROR, ON, OFF]
#06	TAD/FAX RING COUNT	2 [1...4, TOLL SAVER, RINGER OFF]
#10	RECORDING TIME	VOX [VOX, 1MIN]
#11	REMOTE TAD ID	ID = 111
#13	DIALING MODE	AUTO [AUTO, TONE, PULSE]
#15	SEND BY MEMORY	OFF [ON, OFF]

Code

ID = 111

Set Value

[ADVANCED FEATURE LIST]

NO.	FEATURE	CURRENT SETTING
#22	JOURNAL AUTO PRINT	ON [ON, OFF]
#23	OVERSEAS MODE	OFF [ON, OFF]
#25	DELAYED TRANSMISSION	OFF [ON, OFF]
	DESTINATION =	
	START TIME = 12:00AM	
#26	AUTO CALLER ID LIST	ON [ON, OFF]
#30	SILENT FAX RECOGNITION RING	3 [3...6]
#31	RING DETECTION	OFF [OFF, A, B, C, D]
#36	RECEIVE REDUCTION	92% [72, 86, 92, 100]
#39	LCD CONTRAST	NORMAL [NORMAL, DARKER]
#41	FAX ACTIVATION CODE	ON [ON, OFF]
	CODE = *9	
#42	MESSAGE ALERT	OFF [ON, OFF]
#43	RECORDING TIME ALERT	OFF [ON, OFF]
#44	MEMORY RECEIVE ALERT	ON [ON, OFF]
#46	FRIENDLY RECEPTION	ON [ON, OFF]
#47	FAX VOICE GUIDANCE	ON [ERROR, ON, OFF]
#54	GREETING MSG. RECORDING TIME	16s [16s, 60s]
NOTE : If you change from 60sec. to 16sec. your-greeting will be erased and your new greeting will be limited to 16 seconds.		
#60	MESSAGE TRANSFER	OFF [MESSAGE, PAGER, OFF]
	DESTINATION =	
#61	TRANSFER GREETING	CHECK [CHECK, RECORD, ERASE]
#67	ICM MONITOR	ON [ON, OFF]
#70	FAX PAGER CALL	OFF [ON, OFF]
	DESTINATION =	
#75	IQ-FAX	OFF [ON, OFF]
#76	CONNECTING TONE	ON [ON, OFF]
#77	AUTO ANSWER MODE	TAD/FAX [TAD/FAX, FAX ONLY, TEL/FAX]
#78	TEL/FAX DELAYED RING	2 [1...4]
#79	FIRM DETECTION	ON [ON, OFF]
#80	SET DEFAULT	

Code

CODE = *9

Set Value

IF YOU HAVE A PROBLEM WITH YOUR FAX MACHINE, CALL TOLL-FREE 1-800-HELP-FAX (1-800-435-7329)

Note:

The above values are the default values.

4.4 SERVICE FUNCTION TABLE

Code	Function	Set Value	Effective Range	Default	Remarks
501	Pause time set	X 100 msec	001~600	050	
502	Flash time set	X 10 msec	01~99	70	
503	Dial speed select	1:10 pps 2:20 pps	1, 2	1	
510	VOX TIME	1:6 sec 2:4 sec	1, 2	1	
520	CED frequency select	1:2100 Hz 2:1100 Hz	1, 2	1	See page 52.
521	International mode select	1:ON 2:OFF	1, 2	1	See page 52.
522	Auto standby select	1:ON 2:OFF	1, 2	1	The resolution reverts to the default when transmission is complete.
523	Receive equalizer select	1:0 km 2:1.8 km 3:3.6 km 4:7.2 km	1~4	1	Set RX equalizer to automatic mode.
524	Transmission equalizer select	1:0 km 2:1.8 km 3:3.6 km 4:7.2 km	1~4	1	
533	Setting the number of times that message transfer is redialed.	00~99	00~99	030	Selects the number of times that message transfer is redialed (not including the first dialing).
534	Setting the message transfer/pager call redial interval	001~999 sec	001~999	030	Sets the interval of message transfer/pager call redial.
550	Memory clear: To reset the value to the default one, except the top margin (853) and left margin (854).				"START" input
551	ROM check				"START" input
552	DTMF single tone test	1:ON 2:OFF	1, 2	2	See page 105.
553	Monitor on FAX communication select	1: OFF 2:PHASE B 3:ALL	1~3	1	
554	Modem test				See page 105.
555	Scan check				See page 105.
556	Motor test			00	See page 105.
557	I FD test				See page 105.
558	LCD test				See page 105.
559	Document jam detection select	1:ON 2:OFF	1, 2	1	See page 28.
561	KEY test				See page 105.
563	Scanner position adjustment value set	X 1 mm	00~30	----	See page 119.

Code	Function	Set Value	Effective Range	Default	Remarks
570	BREAK % select	1:61% 2:67%	1, 2	1	
571	ITS auto redial time set	X number of times	00~99	14	
572	ITS auto redial line disconnection time set	X second	001~999	030	
573	Remote turn-on ring number set	X number of rings	01~99	15	
580	TAM continuous tone detection	1:ON 2:OFF	1, 2	1	
590	FAX auto redial time set	X number of times	00~99	005	
591	FAX auto redial time disconnection time set	X second	001~999	045	
592	CNG transmit select	1: OFF 2:ALL 3:AUTO	1~3	2	
593	Time between CED and 300bps	1: 75 msec 2:500 msec 3:1 sec	1~3	1	See page 52.
594	Overseas DIS detection select	1:detects at the 1st time 2:detects at the 2st time	1, 2	1	See page 52.
595	Receive error limit value set	X Number of times	001~999	100	If the number of errors during transmission exceeds this value, the sending side terminates the call.
596	Transmit level set	X dBm	- 15~00	10	Values entered without a "minus sing" will be regarded as negative.
598	Receiving sensitivity	43= -43 dBm	20~48	41	Used when there is an error problem. If set to 41, the vaule will become -43dBm on the hardware side.
599	ECM Frame size	1: 256 byte 2:64 byte	1, 2	1	Used during ECM communication.
602	Warning LIST Printing	1:ON 2:OFF	1, 2	1	Used to print a caution list when setting the TEL/FAX mode and ring detection.
717	Transmit speed selection	1:14400BPS 2:12000BPS 3:9600BPS 4:7200BPS 5:4800BPS 6:2400BPS	1~6	1	Sets fall back speed in the transmitting mode.(See page 52.)
718	Receive speed selection	1:14400BPS 2:12000BPS 3:9600BPS 4:7200BPS 5:4800BPS 6:2400BPS	1~6	1	Sets fall back speed in the receiving mode.(See page 52.)
719	Ringer off in TEL/FAX mode	1:ON 2:OFF	1, 2	1	Selects whether the ring is on or off when the unit receives an incoming signal in the TEL/FAX mode when the ringer.
721	Pause tone detect	1:ON 2:OFF	1, 2	1	Sets the tone detection mode in pause.
722	Redial tone detect	1:ON 2:OFF	1, 2	1	Sets the tone detection mode after redialing.

KX-FP270

Code	Function	Set Value	Effective Range	Default	Remarks
731	CPC mode	1:A 2:B 3:OFF	1~3	1	Sets the CPC signal detection mode from the converter
732	AUTO disconnect cancel time	1:350 ms 2:1.8 sec 3:OFF	1~3	1	Sets to "2" when the auto disconnect circuit operates and cuts the line.
745	Powr ON film feed	1:ON 2:OFF	1, 2	1	When the power is turned on, the film is wound to take up any slack.
763	CNG detect time for friendly reception	1:10 sec 2:20 sec 3:30 sec	1~3	3	The period during which CNG is detected during friendly reception.
771	T1 timer	1:35 sec 2:60 sec	1, 2	1	Sets the time out.
775	Monitoring of message transfer	1:ON 2:OFF	1, 2	2	If set to ON a message can be monitored from this unit's SP-PHONE when transferring a message.
784	Voice prompt test				see page 75.
815	Sensor & Vox check				See page 106.
841	Digital SP-phone check				See page 82.
852	Print test pattern				See page 105.
853	Top margin		1~9	-----	
854	Left margin		1~8	-----	
861	A4 size set	1:ON 2:OFF	1, 2	2	Used only at the factory.
880	History list				See page 98.
881	Journal 2 list				See page 103.
882	Journal 3 list				See page 104.
890	TEL/FAX 1st ring back tone	1:ON 2:OFF	1, 2	1	Selects whether the TEL/FAX 1st ring back tone is ON or OFF in the TEL/FAX mode.

4.5 SERVICE MODE SETTINGS (Example of a printed out list)

【 SERVICE DATA LIST 】

Code	Set Value	
501 PAUSE TIME	= 050*100ms	[001...600]*100ms
502 FLASH TIME	= 70*10ms	[01...99]*10ms
503 DIAL SPEED	= 10pps	[1=10 2=20]pps
510 VOX TIME	= 6sec	[1=6 2=4]sec
520 CED FREQ.	= 2100Hz	[1=2100 2=1100]Hz
521 INTL. MODE	= ON	[1=ON 2=OFF]
522 AUTO STANDBY	= ON	[1=ON 2=OFF]
523 RX EQL.	= 0.0Km	[1=0.0 2=1.8 3=3.6 4=7.2]Km
524 TX EQL.	= 0.0Km	[1=0.0 2=1.8 3=3.6 4=7.2]Km
853 TOP MARGIN	= 5	[1...9]
854 LEFT MARGIN	= 5	[1...8]

【 SPECIAL SERVICE SETTINGS 】

533	534	552	553	559	563	570	571	572	573	580	590	591
03	030	2	1	1	15	1	14	030	15	1	05	045
Code	Set Value											
592	593	594	595	596	598	602	717	718	719	721	722	731
2	1	1	100	10	41	1	1	1	1	1	1	1
732	745	763	771	775	861	890						
1	1	3	1	2	2	1						

USAGE TIME = 00000 HOURS

Note:

The above values are the default values.

KX-FP270

[HISTORY]

[F P 2 7 0 A] — (1) [5 C 4 3] — (2)

[N O N E] — (3)

[N O N E] — (4)

[N O N E] — (5)

(6) — [0 0 0 0 0] [M a y] — (7) [2 6] — (8) [1 9 9 8] — (9) [1 2 0 5 P M] — (10)

(11) — [0 0 0 0 4] [0 0 0 0 0] — (12)

(13) — [0 0 0 0 0] [0 0 0 0 0] [0 0 0 0 0] [0 0 0 0 4] — (16)

0 0 3 4 8 0 0 0 0 0 P U L S E — (18) [9 2 %] — (19)

(21) — [0 0 0 0 0] [0 0 0 0 1] [0 0 0 0 1] [0 0 0 0 0] — (24)

(26) — [N O N E] [N O N E] — (27) [N O N E] — (28) [N O N E] — (29)

(30) — [0 0 1] (31) — [0 0 0] (32) — [0 0 0 0 0] [N O N E] — (33)

(36) — [0 0 0 0 0] [0 0 0 0 0] [0 0 0 0 0] [0 0 0 1 5] — (39)

(42) — [0 0 0 0 0] [0 0 0 0 0] [0 0 0 0 0] [0 0 0 0 1] — (45)

(34) — [0 0 0 0 0] [0 0 0 0 0] — (35)

(40) — [0 0 0 0 0] [0 0 0 0 0] — (41)

[0 0 1 3 9] — (25)

[0 0 0 0 2] — (20)

[0 0 0 0 0] — (46)

2 0	3 C	3 A	3 1	0 4	3 A	3 5	3 2	3 6	0 4	3 1	3 2	3 A
3 5	3 B	0 4	0 1	0 1	0 1	0 C	0 C	1 4	0 4	0 1	1 4	0 4
0 1	1 4	0 4	0 1	1 4	0 4	0 1	1 4	0 4	0 1	1 4	0 4	0 1
1 4	0 4	0 1	1 4	0 4	0 1	1 4	0 1	2 2	2 2	2 2		
0 4	0 1	1 4	0 4	0 1	1 4	0 4	0 1	2 0	0 4	1 E	1 E	1 E
1 E	1 F	0 4	2 0	1 8	1 E	1 E	1 E	1 E	1 E	1 E	1 E	1 E
1 E	1 E	1 E	1 E	1 E	1 E	1 E	1 E	1 E	0 1	1 4	0 4	0 1
2 0	3 C	3 9	3 A	3 A	3 A	3 B	3 8	3 8	3 A	0 4		

NAME _____ DATE _____ DEALER _____ FILM _____

CUSTOMER COMPLAINT _____

SURVEY RESULT : CKOK (UNKNOWN/DESIGN/EDUC) DEFECT (PART/WORKER/DESIGN)
 ABUSE (CUST/DEALER/SHIP) NEW (OPEN/NOT)
 PHONE SURVEY RESULT.

Note: See the next page for an explanation of this report.

Descriptions of individual items on the previous page.

- | | |
|---|--|
| <p>(1) ROM VERSION
EPROM version</p> <p>(2) SUM
EPROM internal data calculation.</p> <p>(3) YOUR LOGO
The recorded LOGO in the unit. If it is not recorded, NONE will be displayed.</p> <p>(4) YOUR TELEPHONE NUMBER
The recorded user telephone number in the unit. If it is not recorded, NONE will be displayed.</p> <p>(5) FAX PAGER NUMBER
If you program a pager number into the unit, the pager number will be displayed here.</p> <p>(6) FACTORY - CUSTOMER
This shows how many days from factory production until the user turns ON the unit.</p> <p>(7) MONTH </p> <p>(8) DAY </p> <p>(9) YEAR </p> <p>(10) TIME </p> <p>(11) USAGE TIME
The amount of time the unit has been powered ON.</p> <p>(12) FACTORY - NOW
This shows how many days from factory production until the user prints out this history list.</p> <p>(13) TEL MODE
The amount of time the TEL mode setting was used.</p> <p>(14) FAX MODE
The amount of time the FAX mode setting was used.</p> <p>(15) TEL/FAX MODE
The amount of time the TEL/FAX mode setting was used.</p> <p>(16) ANS/FAX MODE
The amount of time the ANS/FAX mode setting was used.</p> <p>(17) FINAL RECEIVE MODE
The last set receiving mode by the user.</p> <p>(18) TONE/PULSE SELECTION
The most recently used setting used, either TONE or PULSE.</p> <p>(19) RECEIVE REDUCTION
The compression rate when receiving.</p> | <p>(20) SETTING NO. OF DIRECTORY
The recorded directory stations (one touch and JOG DIAL).</p> <p>(21) NUMBER OF COPY
The number of pages copied.</p> <p>(22) NUMBER OF RECEIVE
The number of pages received.</p> <p>(23) NUMBER OF SENDING
The number of pages sent.</p> <p>(24) NUMBER OF CALLER ID
The number of times Caller ID was received.</p> <p>(25) NUMBER OF RECORDING MESSAGE
The number of messages recorded in TAM.</p> <p>(26) NUMBER OF PC SCAN
The number of times multifunction was used for the Scanner. (The number of pages scanned. If the unit does not have a PC interface, NONE will be printed.)</p> <p>(27) NUMBER OF PC-PRINT
The number of times multifunction was used for the Printer. (The number of pages printed. If the unit does not have a PC interface, NONE will be printed.)</p> <p>(28) NUMBER OF RECEIVING TO PC
The number of times received in the PC through the FAX serial interface (RS232C). (The number of pages received. If the unit does not have a PC interface, NONE will be printed.)</p> <p>(29) NUMBER OF SENDING FROM PC
The number of times transmitted from the PC through the FAX serial interface (RS232C). (The number of pages transmitted. If the unit does not have a PC interface, NONE will be printed.)</p> <p>(30) NUMBER OF PRINTING WARNING LIST
The number of warning lists printed until now.</p> <p>(31) NUMBER OF PRINTING HELP
The number of help lists printed until now.</p> <p>(32) NUMBER OF DIVIDED PRINTING IN FAX RECEPTION
The number of faxes received that were divided into more than one sheet since the unit was purchased.</p> <p>(33) DETECTION OF RS232C
When the fax and PC serial cable (RS232C) are connected and the signal is received correctly, COMPLETE will be printed. For models without a PC interface or when there is a PC interface but the signal cannot be received between the fax and PC, INCOMPLETE will be printed.
(The number of pages transmitted. If the unit does not have a PC interface, NONE will be printed.)</p> |
|---|--|

KX-FP270

- (34) **NO. OF IQ FAX LOADING -OK** 
(35) **NO. OF IQ FAX LOADING -NG**

You may not be able to use IQ-FAX if the special subscriber information is not loaded from the IQ-FAX center before use. Depending on the conditions of the communication line, it may not be completed in one time, so retried will be performed. The number of times there was an OK and NG are printed.

- (36) **FAX MODE**
Means the unit received a fax message in the FAX mode.
- (37) **MAN RCV**
Means the unit received a fax message by manual operation.
- (38) **FRN RCV**
Means the unit received a fax message by friendly signal detection.
- (39) **VOX**
Means the unit detected silence or no voice.
- (40) **RMT DTMF**
Means the unit detected DTMF (Remote Fax activation code) entered remotely.
- (41) **PAL DTMF**
Means the unit detected DTMF (Remote Fax activation code) entered by a parallel connected telephone.
- (42) **TURN-ON**
Means the unit started to receive after 15 rings.
(Remote Turn On: Service Code #573)

- (43) **TIME OUT**
Means the unit started to receive after Ring Time Out in the EXT-TAM or TEL/FAX mode.

- (44) **IDENT**
Means the unit detected Ring Detection.

- (45) **CNG OGM**
Means the unit detected the CNG while it was sending the Dummy Ring Back Tone in the TEL/FAX mode, or while answering a call in the EXT-TAM mode.
OR
Means the unit detected the CNG while it was sending the OGM in the ANS/FAX mode.

- (46) **CNG ICM**
Means the unit detected the CNG while it was recording the ICM in the ANS/FAX mode.

- (47) **KEY OPERATION -1st 50** 
(48) **KEY OPERATION -Last 50**

Indicates 2-digit codes. Refer to "5.2 BUTTON CODE TABLE" on page 106.

- 1st 50: History of the first 50 key operations after purchase.
(Ex.) If 20, 3C and 39 are printed, then the MENU, # and 9 buttons were pressed.
- Last 50: History of the last 50 key operations.

4.7 SPECIAL SERVICE JOURNAL REPORTS

Journal 2 or Journal 3 shown below, which are special journals giving additional detailed information about the latest 35 communications, can be printed using service code 881 or 882. They can also be printed out remotely (with the existing journal). [Refer to page 62.] Journal 2 and Journal 3's data are related.

JOURNAL

Mar. 23 1998 09:51PM

NO.	OTHER FACSIMILE	START TIME	USAGE TIME	MODE	PAGES	RESULT	*CODE
01	3332222	Jan. 21 02:14PM	00'45	SND	01	OK	
02	9998765	Jan. 21 03:17PM	00'58	TQ-FAX	02	OK	
03	John	Jan. 21 05:18PM	00'48	RCV	01	OK	
04	555556677	Jan. 22 10:35AM	02'45	SND	03	COMMUNICATION ERROR (43)	

JOURNAL 2

Mar. 23 1998 09:51AM

NO.	① RCV. MODE	② SPEED (CNT.)	③ RESOLUTION	④ RCV-TRIG. (CNT.)	⑤ ERROR->MEMORY
01	TEL	9600BPS	STD.		
02	TEL	9600BPS	FINE		
03	FAX ONLY	7200BPS	STD.	FAX MOD	
04	FAX ONLY	9600BPS	STD.	CNG (0003)	

NO RESPONSE DISAPPEARED ON JOURNAL

NO.	START TIME	① RCV MODE	④ RCV-TRIG (CNT.)
	YOUR LOGO		
	YOUR FAX NUMBER		

JOURNAL 3

Mar. 23 1998 09:51AM

NO.	⑥ ENCODE	⑦ MSLT	⑧ EQM (RX)	⑨ ERROR LINE (RX)	⑩ MAKER CODE
01	MH	20msec	0000	00000	79
02	MH	20msec	0000	00000	00
03	MR	20msec	1200	00013	00
04	MR	20msec	0000	00000	00

For example, the 1st communication in the Journal above is a Fax transmission in the Tel mode, at 9.6 kbps TX speed, the resolution is standard, a MH code is used, and the Maker code is 79.

The 2nd one is IQ-Fax in Tel mode, and the resolution is fine etc.

CNG (0003) means the 3rd time a CNG signal was received for Fax Rx from purchasing the unit until now.

Journal 2 and Journal 3 are explained on the next page.

KX-FP270

4.7.1 JOURNAL 2

Journal 2 displays the additional detailed information about the last 35 communications.

Description of individual items from the previous page.

① **RCV. MODE**

Indicates which receive mode the unit was in when the unit received a fax message.
This information is also displayed when the unit transmitted a fax message.

② **SPEED**

Indicates the speed of the communication. If multiple pages are transmitted or received, it indicates the last page's communication speed. If there is a communication error, "?" is displayed.

③ **RESOLUTION**

Indicates the resolution of the communication. If multiple pages are transmitted or received, it indicates the last page's resolution. If there is a communication error, "?" is displayed.

④ **RX-TRIG. (CNT.)**

Indicates the trigger that causes the unit to switch to the fax receive mode. The available options are listed in the below (Refer to page 100.) The values in parentheses indicate how many times the trigger has been used. (For example, "00003" means three times.)

⑤ **ERROR→MEMORY**

Indicates the reason why the unit received a fax message in memory.
In the printing example on the next page, a "paper out" error occurred and direct reception to fax memory took place.

NO RESPONSE DISAPPEARED ON JOURNAL

The NO RESPONSE DISAPPEARED ON JOURNAL displays the information about the last 10 communications terminated with No Response. (Some of the communications terminated by No Response were not displayed in the JOURNAL.)

When fax transmission cannot be performed because the other party's unit is set to the TEL mode, "No response" will be printed.

4.7.2 JOURNAL 3

Description of individual items.

⑥ **ENCODE**

Compression Code : MH/MR

⑦ **MSLT**

MSLT means Minimum Scan Line Time.
Use only at the factory.

⑧ **EQM**

EQM means Eye Quality Monitor.
Use only at the factory.

⑨ **ERROR LINE(RX)**

When an error occurs while receiving a fax, this shows the number of lines received.

⑩ **MAKER CODE**

This shows a 2 digit code of the other party's fax machine brand.

0E: "KX" model
00: Unknown
79: "UF" model
19: "Zerex" model

4.7.3 PRINTOUT EXAMPLE

JOURNAL 2

Mar. 25 1998 01:59PM

TROUBLESHOOTING GUIDE

NO.	RCV. MODE	SPEED (CNT.)	RESOLUTION	RCV-TRIG. (CNT.)	ERROR->MEMORY
01	FAX ONLY	9600BPS	FINE.	FAX MOD	
02	FAX ONLY	9600BPS	STD.	FAX MOD	
03	FAX ONLY	9600BPS	FINE.		
04	FAX ONLY	9600BPS	FINE.	FAX MOD	
05	FAX ONLY	9600BPS	FINE.	FAX MOD	
06	FAX ONLY	9600BPS	FINE.	FAX MOD	
07	FAX ONLY	9600BPS	FINE.		
08	FAX ONLY	9600BPS	FINE.		
09	FAX ONLY	9600BPS	FINE.		
10	FAX ONLY	9600BPS	STD.	FAX MOD	
11	FAX ONLY	9600BPS	FINE.	FAX MOD	
12	FAX ONLY	9600BPS	STD.	FAX MOD	PAPER OUT
13	FAX ONLY	9600BPS	STD.		
14	FAX ONLY	?	?		
15	FAX ONLY	?	?		
16	FAX ONLY	?	?		
17	FAX ONLY	9600BPS	STD.		
18	FAX ONLY	9600BPS	FINE.	FAX MOD	
19	FAX ONLY	9600BPS	STD.	FAX MOD	
20	FAX ONLY	9600BPS	S-FINE.		
21	FAX ONLY	9600BPS	FINE.		
22	FAX ONLY	9600BPS	FINE.	FAX MOD	
23	FAX ONLY	?	?	FAX MOD	
24	FAX ONLY	9600BPS	STD.	FAX MOD	
25	FAX ONLY	9600BPS	STD.	FAX MOD	
26	FAX ONLY	9600BPS	FINE.	FAX MOD	
27	FAX ONLY	9600BPS	FINE.		
28	FAX ONLY	9600BPS	STD.	FAX MOD	
29	FAX ONLY	9600BPS	FINE.	FAX MOD	
30	FAX ONLY	9600BPS	S-FINE.	FAX MOD	
31	FAX ONLY	9600BPS	STD.	FAX MOD	
32	FAX ONLY	9600BPS	STD.	FAX MOD	
33	FAX ONLY	?	?	FAX MOD	
34	FAX ONLY	9600BPS	STD.	FAX MOD	
35	FAX ONLY	9600BPS	STD.	FAX MOD	

NO RESPONSE DISAPPEARED ON JOURNAL

NO.	START TIME	RCV. MODE	RCV-TRIG. (CNT.)
-----	------------	-----------	------------------

YOUR LOGO
YOUR FAX NUMBER

KX-FP270

JOURNAL 3

Mar. 25 1998 01:58PM

NO.	ENCODE	MSLT	EQM(RX)	ERROR LINE(RX)	MAKER CODE
01	MR	10mSec	007A	00000	0E
02	MR	20mSec	016B	00000	00
03	MH	10mSec	0000	00000	00
04	MR	20mSec	019B	00003	00
05	MR	20mSec	0156	00011	00
06	MR	20mSec	0113	00000	00
07	MR	5mSec	0000	00000	79
08	MR	5mSec	0000	00000	79
09	MR	0mSec	0000	00000	19
10	MR	20mSec	0100	00000	00
11	MR	10mSec	0073	00000	0E
12	MR	20mSec	012B	00000	00
13	MH	20mSec	0000	00000	79
14	MH	20mSec	0000	00000	00
15	MH	20mSec	0000	00000	00
16	MH	20mSec	0000	00000	00
17	MR	5mSec	0000	00000	79
18	MR	10mSec	00AB	00004	0E
19	MR	20mSec	0124	00000	00
20	MR	20mSec	0000	00000	00
21	MR	20mSec	0000	00000	00
22	MR	20mSec	0135	00000	00
23	MR	20mSec	0000	00000	00
24	MR	20mSec	01BC	00000	00
25	MR	20mSec	01AC	00000	00
26	MR	20mSec	020F	00000	00
27	MR	10mSec	0000	00000	0E
28	MR	20mSec	01DF	00000	00
29	MR	20mSec	01EA	00000	00
30	MR	20mSec	00CD	00000	00
31	MR	20mSec	02F8	00000	0E
32	MR	10mSec	04F8	00000	0E
33	MR	10mSec	0000	00000	00
34	MR	20mSec	03B6	00000	0E
35	MH	20mSec	00E0	00000	00

5. TEST FUNCTIONS

The codes listed below can be used to perform simple checks of some of the unit's functions. When complaints are received from customers, they provide an effective tool for identifying the locations and causes of malfunctions.

Test mode	Type of Mode	Code <input type="text"/> <input type="text"/> <input type="text"/>	Function
		Operation after code input	
MOTOR TEST	Service Mode	<input type="text"/> 5 <input type="text"/> 5 <input type="text"/> 6	Rotates the transmission and reception motors to check the operation of the motors. 00 ... Stop 10 ... FF RX motor --- Copy/List/Fax RX printing and print out 20 ... FF RX motor --- Copy/List/Fax RX printing and print out (When all white lines are read.) 01 ... FF TX motor --- Copy/TX reading 02 ... FF TX motor --- Document print out 03 ... Backward TX motor --- Factory use only 04 ... Backward TX motor --- Recording Paper is fed. Note : You can perform two tests at the same time. Ex. if you enter "14", the tests for "10" and "04" will be performed at the same time. When feeding the recording paper, the ink film should be inserted. • Press the STOP button to quit.
		START	
MODEM TEST	Service Mode	<input type="text"/> 5 <input type="text"/> 5 <input type="text"/> 4	First, go OFF-HOOK with the handset to enter this Test Mode. Each time you press the start key, each of the signals will be heard in the following order from the handset. 1) OFF → 2) 14400bps → 3) 12000bps → 4) 9600bps (V17) → 5) 7200bps (V17) → 6) 9600bps → 7) 7200bps → 8) 4800bps → 9) 2400bps → 10) 300bps → 11) 2100Hz → 12) 1100Hz
		START	
ROM CHECK	Service Mode	<input type="text"/> 5 <input type="text"/> 5 <input type="text"/> 1	Indicates the version and check sum of the ROM.
		START	
SCAN CHECK	Service Mode	<input type="text"/> 5 <input type="text"/> 5 <input type="text"/> 5	Turns on the LEDs of the CCD unit and operates the read system. This is also used to adjust the CCD. (Refer to page 114.)
		START	
LCD CHECK	Service Mode	<input type="text"/> 5 <input type="text"/> 5 <input type="text"/> 8	Checks the LCD indication. Illuminates all the dots to check if they are normal.
		START	
DTMF SINGLE TEST	Service Mode	<input type="text"/> 5 <input type="text"/> 5 <input type="text"/> 2	Outputs DTMF as single tones. Used to check the frequencies of the individual DTMF tones. Refer to "5.1 DTMF Single Tone Transmit Select" on page 106.
		1..On 2..Off	
LED TEST	Service Mode	<input type="text"/> 5 <input type="text"/> 5 <input type="text"/> 7	All LEDs above the operation panel board flash on and off, or are illuminated.
		START	
KEY CHECK	Service Mode	<input type="text"/> 5 <input type="text"/> 6 <input type="text"/> 1	Checks the button operation. Indicates the button code on the LCD while the button is pressed. Refer to "5.2 Button Code Table" on page 106.
		START { any key }	
FACTORY SET	Service Mode	<input type="text"/> 5 <input type="text"/> 5 <input type="text"/> 0	Clears the memory where the user can store data.
		START	
CCD AUTO POSITION ADJUSTMENT	Service Mode	<input type="text"/> 5 <input type="text"/> 6 <input type="text"/> 4	Used only at the factory.
		START	
PRINT TEST PATTERN	Service Mode	<input type="text"/> 8 <input type="text"/> 5 <input type="text"/> 2	Prints out the test pattern. Used mainly at the factory to test the print quality. You can select 1~4. (See pages 107~110.)
		START	
DIGITAL SPEAKERPHONE RX & TX CHECK	Service Mode	<input type="text"/> 8 <input type="text"/> 4 <input type="text"/> 1	Please refer to page 82.
		SPEAKERPHONE	

KX-FP270

Test mode	Type of Mode	• Code <input type="text"/> <input type="text"/> <input type="text"/>	Function
		• Operation after code input.	
SENSOR CHECK & VOX CHECK	Service Mode	<input type="text"/> 8 <input type="text"/> 1 <input type="text"/> 5	After entering this mode, by operating the sensor levers, etc, using your hands, each sensor and SW display above the LCD will go ON/OFF. Also, when copying a document, the related sensor will turn ON/OFF. (Do, Sn, Pl, Pt, Ri) For each sensor's operation, refer to page 157.
		START	
		LCD display	
		<input type="text"/> Do <input type="text"/> Sn <input type="text"/> Co <input type="text"/> Pl <input type="text"/> Pt <input type="text"/> Ri <input type="text"/> Vx	
		Do: Document set sensor: Sn: Read position sensor: Co: Cover open sensor: Pl: Paper set switch: Pt: Paper top sensor: Ri: Film and sensor: Vx: Vox signal:	
			Paper inserted. Turns on when a document is inserted. At the read position. Turns on when the front cover is opened and the sensor lever is pressed directly. Cover open. Turns on and off when the front cover is opened and closed. Sensor on. Turns on and off when the cassette lock lever is pushed down and up. Sensor on. Turns on when the front cover is opened and the sensor lever is pressed directly. Sensor on. Turns on and off when the film end sensor gear is turned. Detection signal for the tone on the line. If there is a tone, it is ON.

Note: The numbers in the boxes (XXX) indicate the keys to be input for the various test modes.

5.1 DTMF SIGNAL TONE TRANSMIT SELECTION

When set to ON (=1), the 12 keys and transmission frequencies are as shown.

key	High Frequency (Hz)	Key	Low Frequency (Hz)
"1"	697	"5"	1209
"2"	770	"6"	1336
"3"	852	"7"	1477
"4"	941	"8"	1633

When set to OFF (=2), the 12 keys and transmission frequencies are as shown.

High (Hz) \ Low (Hz)			
	1209	1336	1477
697	"1"	"2"	"3"
770	"4"	"5"	"6"
852	"7"	"8"	"9"
941	✕	"0"	"#"

Note: After performing this check, do not forget to turn the setting off.
Otherwise, dialing using DTMF will not be possible.

5.2 BUTTON CODE TABLE

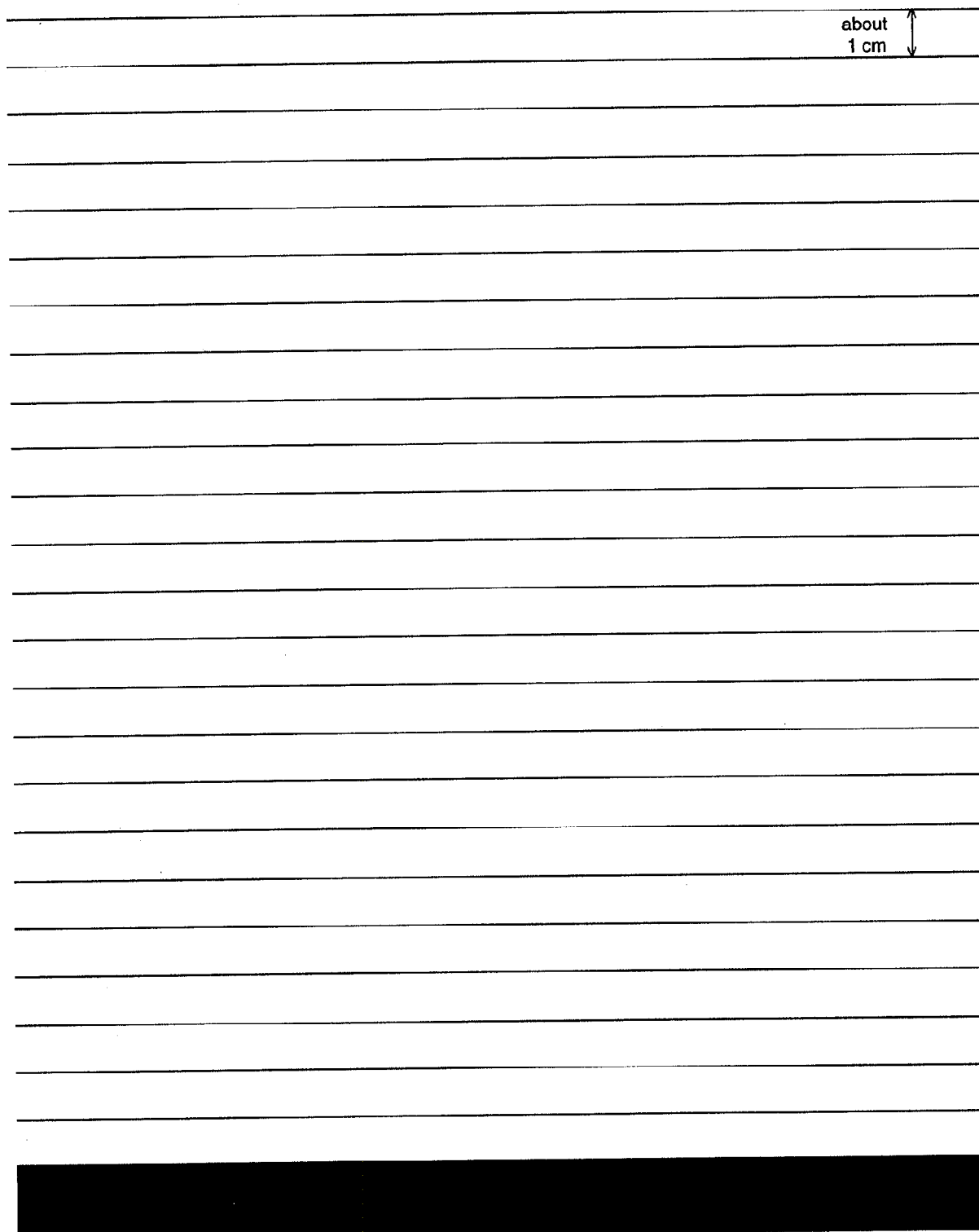
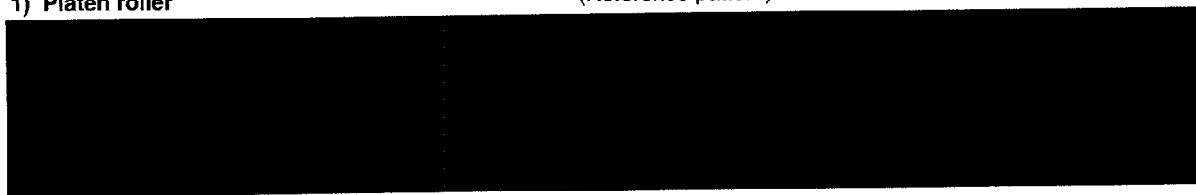
Code	Button Name	Code	Button Name	Code	Button Name
02	RESOLUTION	31	1	3D	REDIAL/PAUSE
04	START/COPY/SET	32	2	3E	FLASH
05	LOWER	33	3	48	IQ-FAX
07	FILM REMAINING	34	4	64	STATION 1
08	SP-PHONE	35	5	65	STATION 2
0A	MUTE	36	6	66	STATION 3
0C	RECEIVE MODE	37	7	67	STATION 4
20	MENU	38	8	68	STATION 5
22	HELP	39	9	1E	JOG (RIGHT)
24	DIRECTORY	3A	0	1F	JOG (LEFT)
25	▲ VOLUME	3B	✕	00	NO INPUT
26	▼ VOLUME	3C	#	01	STOP

Note: These codes (00, 01) are only for the data in the History Report.

5.3 PRINT TEST PATTERN

1) Platen roller

(Reference pattern)

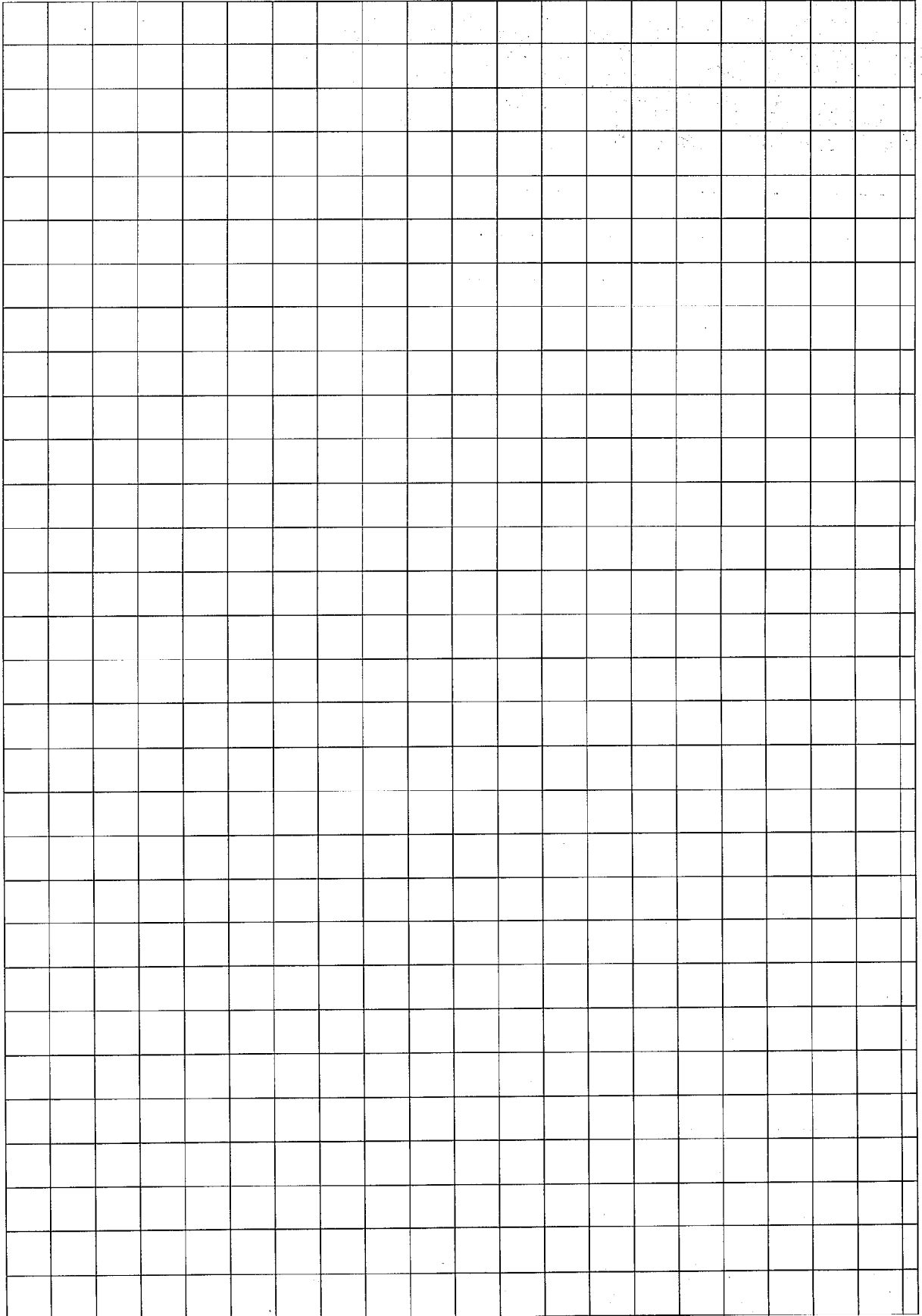


TROUBLESHOOTING GUIDE

KX-FP270

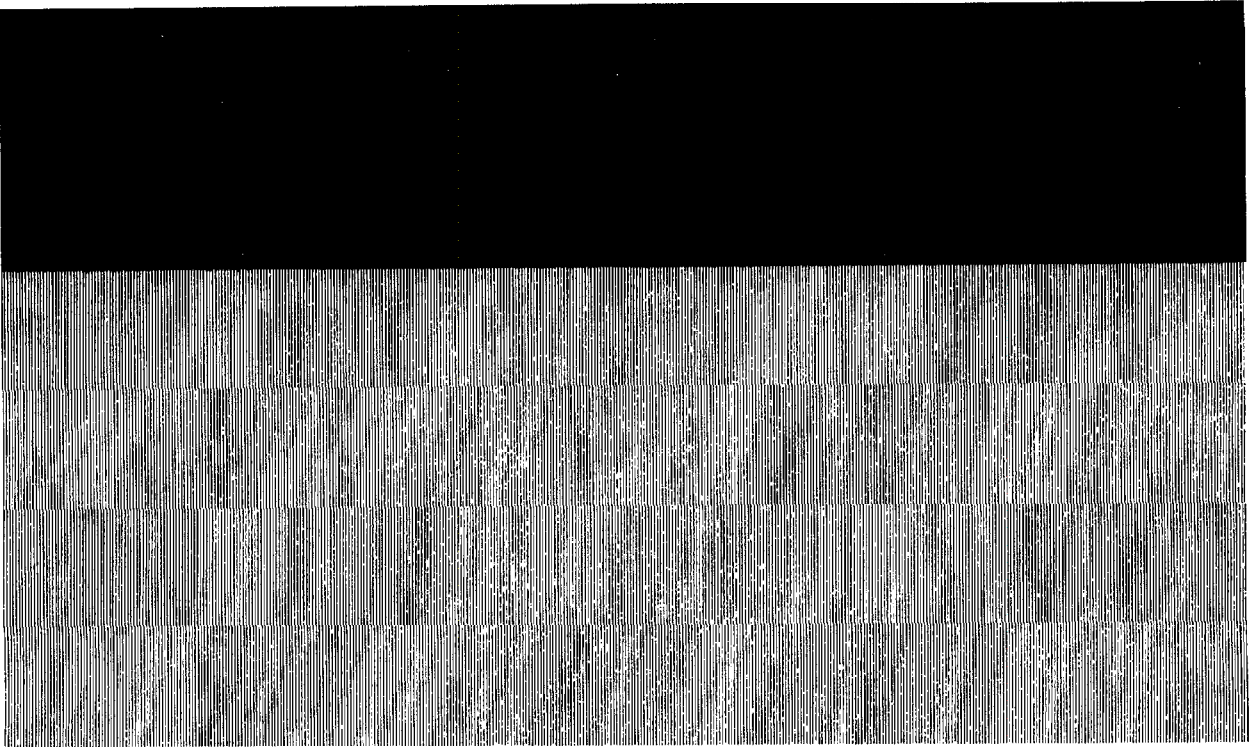
2) Left margin/Top margin

(Reference pattern)



3) Thermal head 1 dot

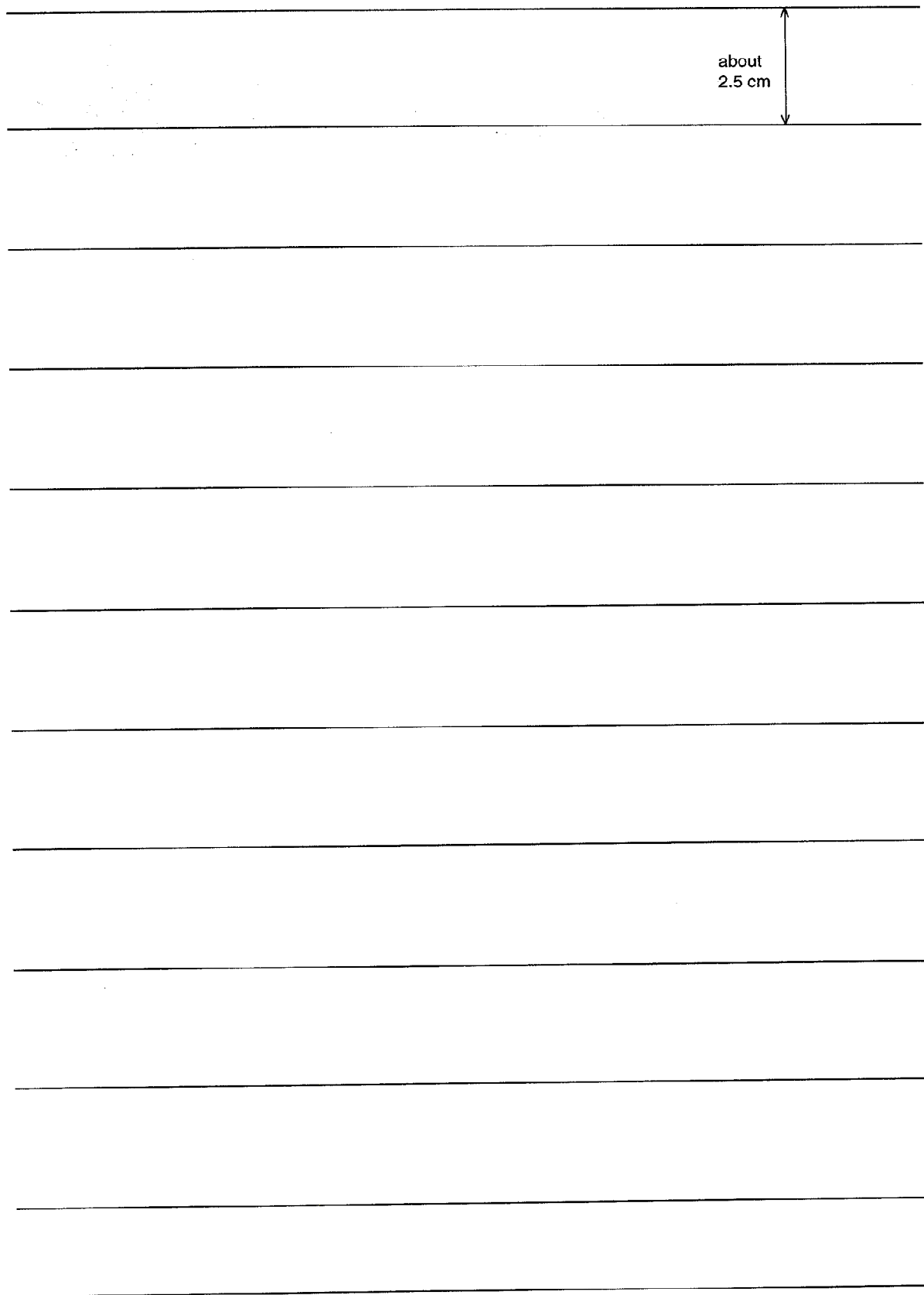
(Reference pattern)



KX-FP270

4) Use this test pattern to confirm the torque limiter for Ink film and platen roller timing.

(Reference pattern)



MEMO

ADJUSTMENTS

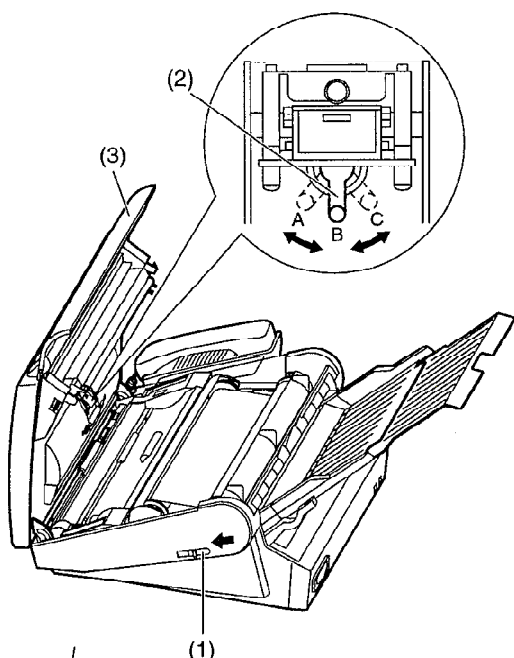
	Page
1. Table of Test Equipment and Tools	113
2. Adjusting the Feeder Pressure	113
3. Confirming the Separation Spring	113
4. CCD Adjustments	114~117
5. Document Read Start Position Adjustment	119

1. TABLE OF TEST EQUIPMENT AND TOOLS

No.	Test Equipment and Jig Name	Jig No.
1	Oscilloscope	—
2	CCD Tool	PFZZ1F780M
3	Extension Cord	PQZZ2K12Z, PQZZ8K18Z
4	Spring Height Tool	PFZZ2FP200M

2. ADJUSTING THE FEEDER PRESSURE

If misfeeding of a document such as multiple feeding or no feeding occurs frequently, try to adjust the feeder pressure by following the steps below.



- (1) Slide the cover open lever forwards to open the front cover.
- (2) Shift the position of the lever by using an instrument with a pointed end, like a clip or ball-point pen.
Position A: Select this when documents are not fed.
Position B: Standard position (pre-selected)
Position C: Select this when documents multiple feed.
- (3) Close the front cover securely by pushing down on both ends.

3. CONFIRMING THE SEPARATION SPRING

1. Open the front cover.
2. Check the highest level of the separation spring with the spring height tool (PFZZ2FP200M). Please make sure that the separation spring does not touch the tool during this operation. (Both right and left) (See Fig. 1.)
3. Check the lowest level of the separation spring with the opposite side of the spring height tool. Please make sure that the separation spring does touch the tool during this operation. (See Fig. 2.)

Note: Be careful not to bend the separation spring.

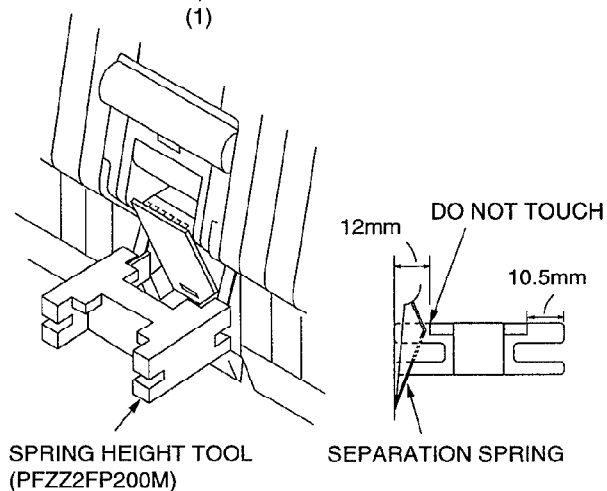


Fig. 1

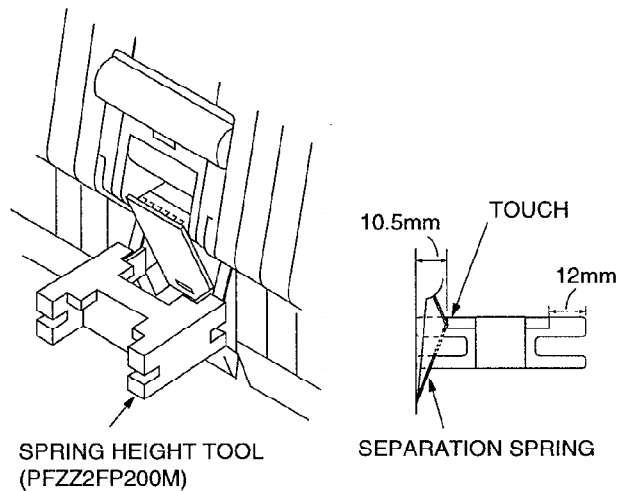


Fig. 2

4. CCD ADJUSTMENTS

To obtain good print quality, perform the following adjustments after replacing the lens and/or CCD board.

4.1 PREPARATION:

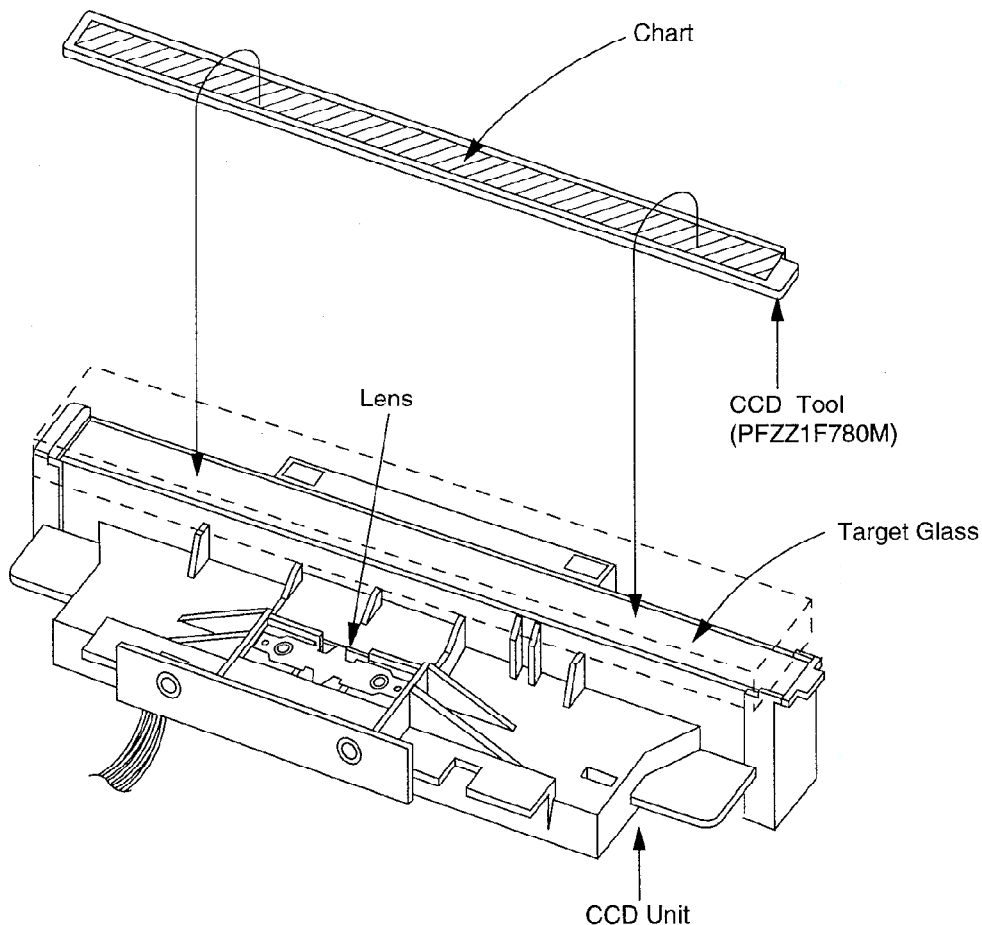
- 1) Remove the CCD board from the unit. (Refer to page 128.)
- 2) Connect the oscilloscope as shown on page 115.
- 3) Attach the CCD TOOL on the CCD unit.
- 4) Connect the CCD unit and the digital board with the extension cord (Part No. PQZZ8K18Z).
- 5) Connect the LED array and the digital board with the extension cord (Part No. PQZZ2K12Z).
- 6) Connect the AC cord.
- 7) Press the MENU button.
- 8) Press the #,9,0,0,0, and * buttons.
- 9) Press 5 three times.

Note:

1. Install the lens so that the marking (RED) is facing up.
2. Do not touch the glass face of the lens with bare hands.
3. If you do not have an instrument to repair the unit, cut out the chart on page 117, then attach it to the target glass (This is a temporary adjustment. You should use a CCD Tool for proper repair.)

Cleaning:

If the lens is dirty, clean it with a soft dry cloth.



Note:

When adjusting, cover the top of the lens with your hands in order to not let in any light.

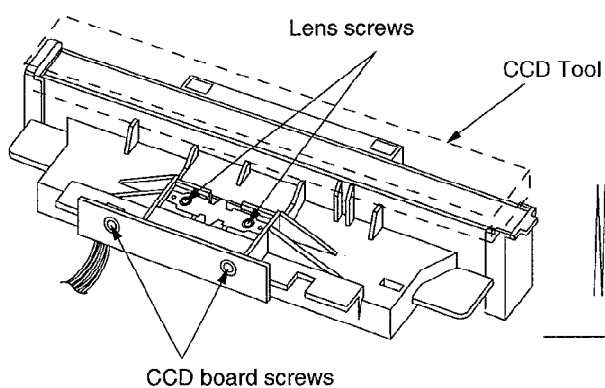
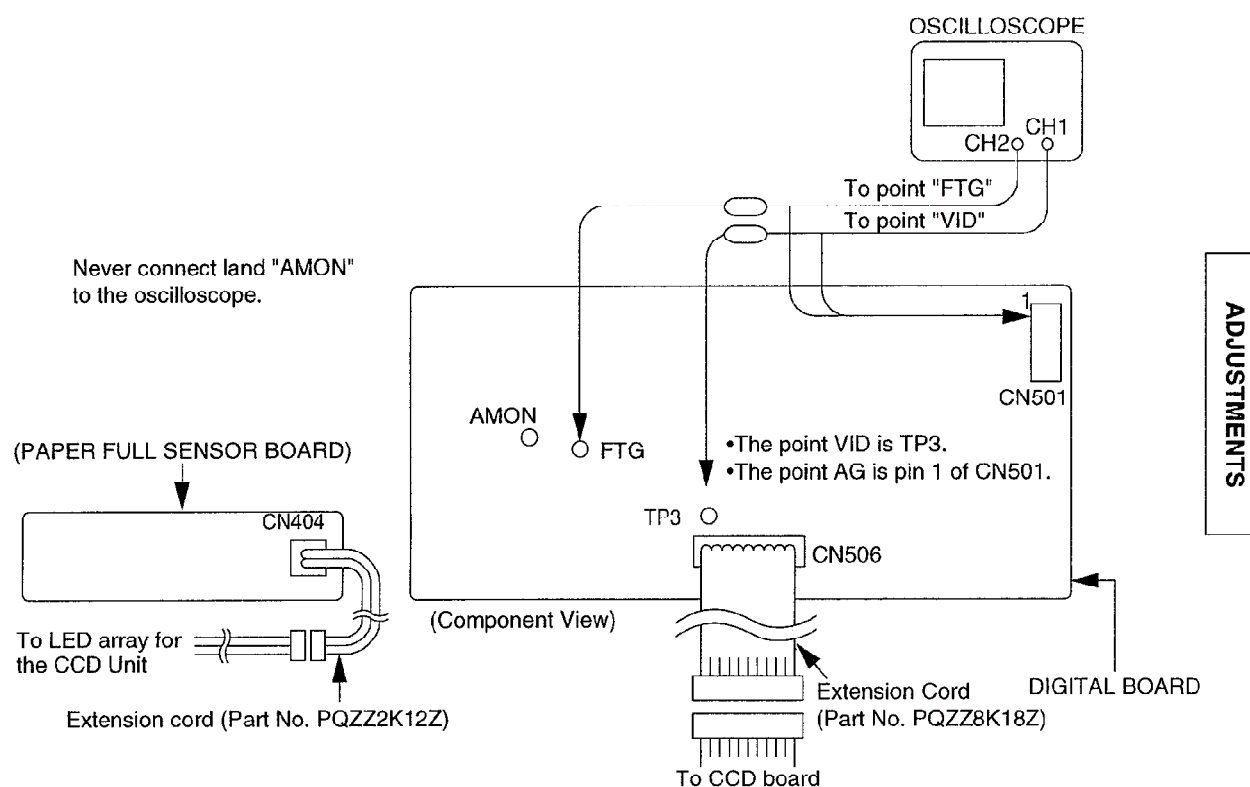
LENS AND CCD READ POSITION ADJUSTMENT

- 1) Loosen the lens screws and CCD board screws.
- 2) Adjust the position of the lens and CCD board so that the waveform appears as shown in the figure below.
- 3) Tighten the lens screws and CCD board screws.

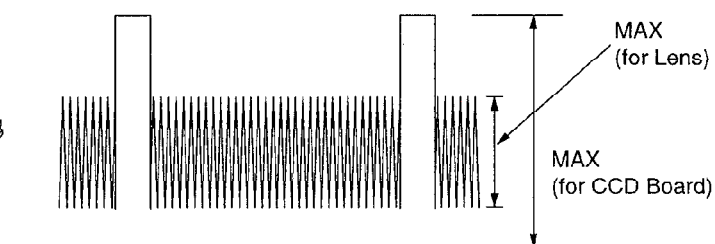
Note: Make sure to observe the instructions in notes 1 and 2 on the preceding page.

Generally, the lens is first temporarily secured and the CCD board is positioned.
Then the optimum lens position is selected.

Oscilloscope setting
CH1 0.5 V/div
CH2 2 V/div
TIME 1 ms
Trigger CH2
Mode AC



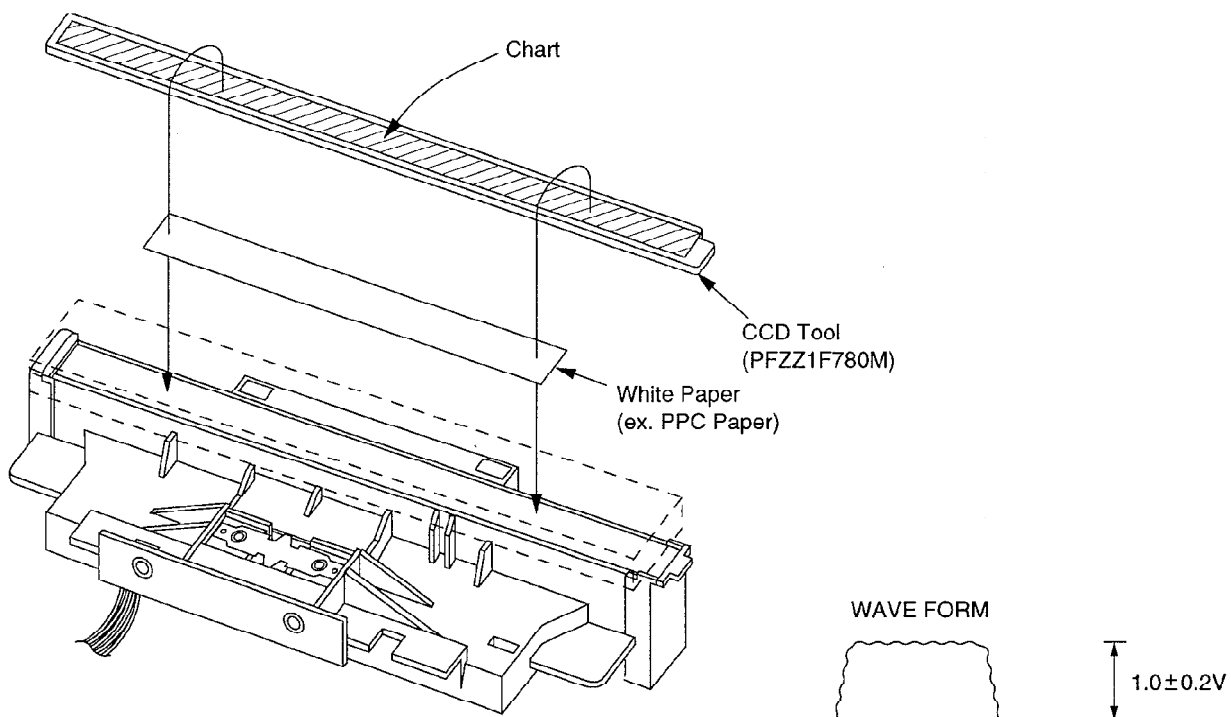
WAVEFORM



4.2 ADJUSTMENT**WHITE LEVEL ADJUSTMENT**

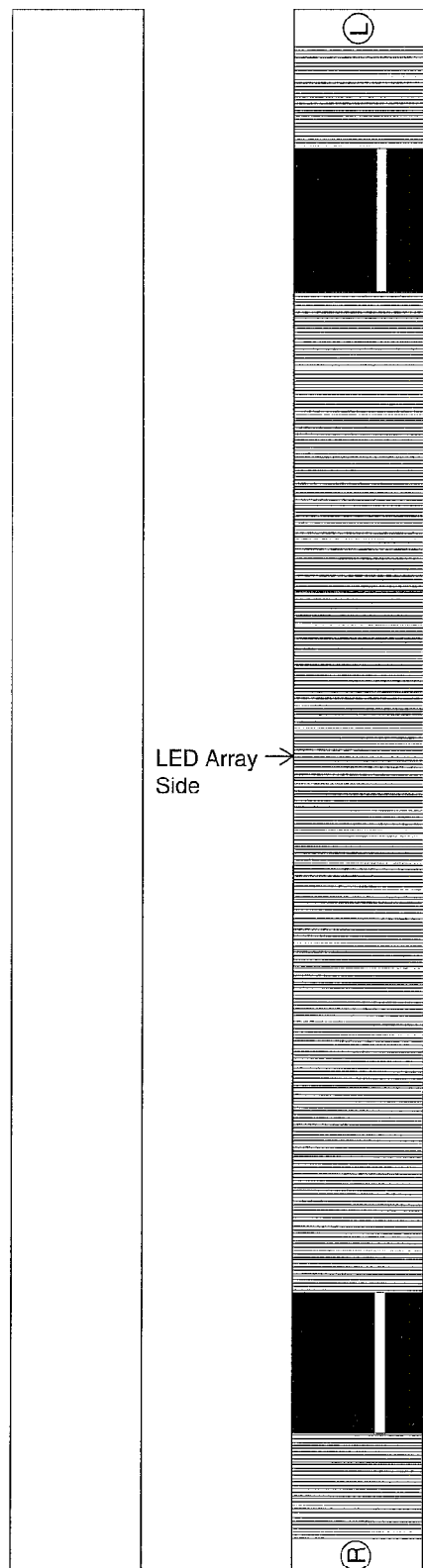
- 1) Remove the CCD TOOL from the CCD unit.
- 2) Attach the white paper to the CCD unit.
- 3) Attach the CCD TOOL to the CCD unit.
- 4) Adjust VR801 on the CCD board so that the waveform becomes $1.2 \pm 0.2V$.

Note: 1. After the adjustment is finished, assemble the unit by reversing the procedure above.
2. While making adjustments, cover the top of the lens (such as a thick piece of paper) to prevent light from entering.
3. If you do not have an instrument to repair the unit, cut out the chart on the next page, then attach it to the target glass.
(This is a temporary adjustment. You should use a CCD Tool for this for accurate repair.)

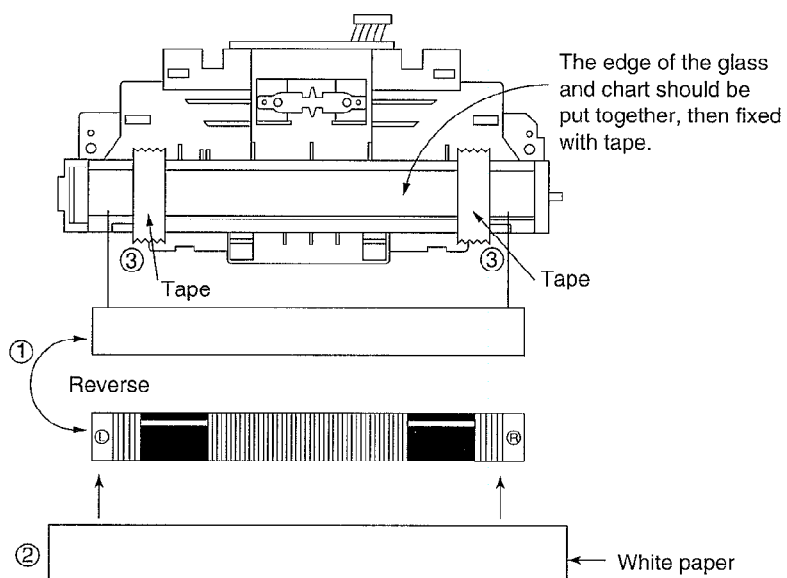


(For white level adjustment)

(For lens and CCD read position adjustment)



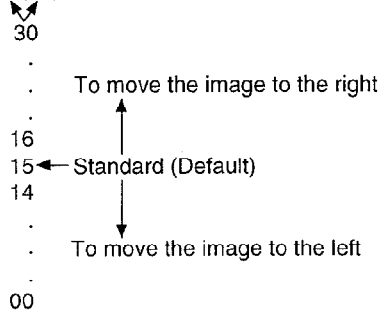
ADJUSTMENTS



KX-FP270

5. DOCUMENT READ START POSITION ADJUSTMENT

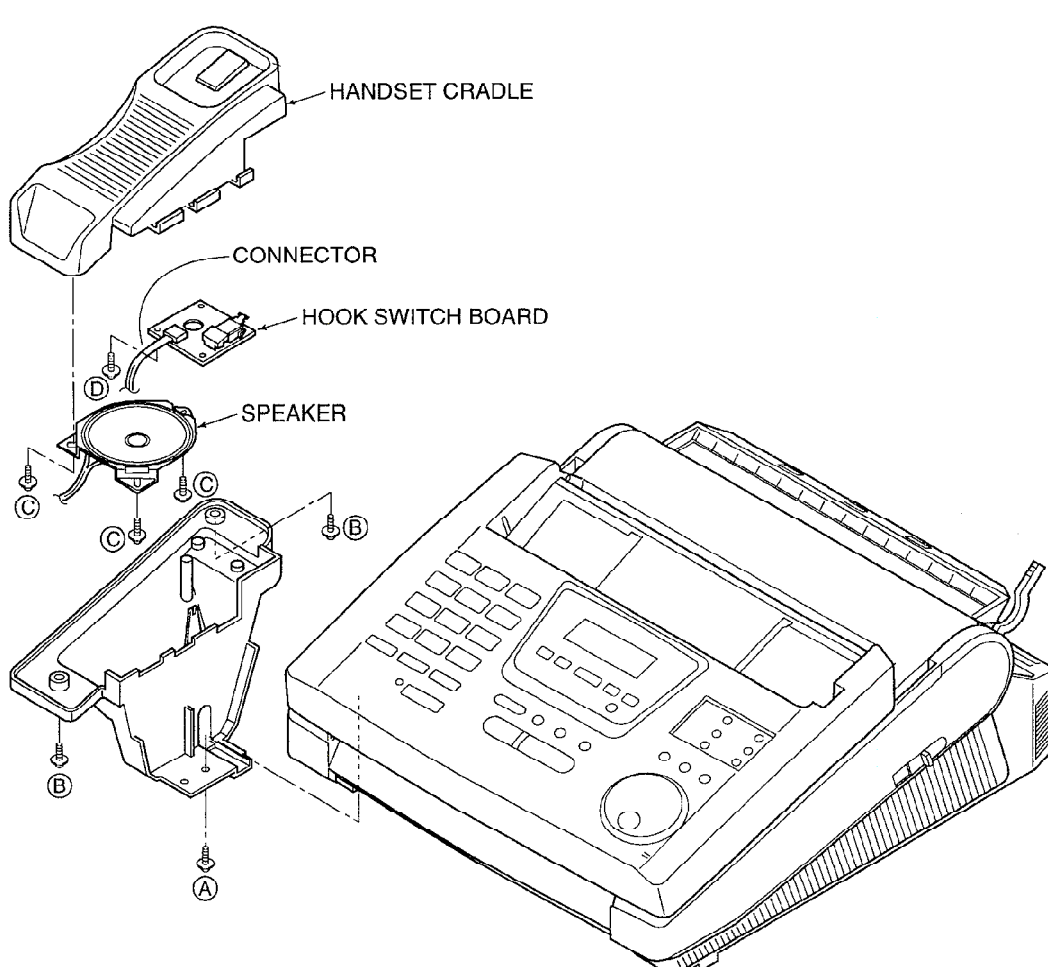
- 1) Connect the AC cord.
- 2) Copy the document and confirm the read start position of the document. Compare the printed result with the original document.
- 3) If out of position, adjust the read position.
- 4) Press the MENU button.
- 5) Press the #, 9, 0, 0, 0, and 5, 6, 3 buttons.
- 6) Press the ☐, ☐, SET and MENU buttons.



The read start position shifts 1 mm for each number.

DISASSEMBLY INSTRUCTIONS

	Page
1. How to Remove the Handset Cradle, Speaker and Hook Switch Board	121
2. How to Remove the Operation Panel Block	122
3. How to Remove the Thermal Head	123
4. How to Remove the Operation Board, LCD and Document Guide ..	124
5. How to Remove the Bottom Frame	124
6. How to Remove the Analog, Digital, Power Supply, Paper Top Sensor Boards and AC Inlet	125~127
7. How to Remove the Lower Cabinet and Film End Sensor Board	128
8. How to Remove the CCD Unit and Paper Full Sensor Board	128
9. How to Remove the Motor Block	129
10. How to Remove the Pickup and Separation Rollers	129
11. How to Remove the Platen Roller	130
12. How to Remove the Document Feed Roller	130
13. How to Remove the Document Tray	131
14. How to Replace Flat Package IC	132, 133

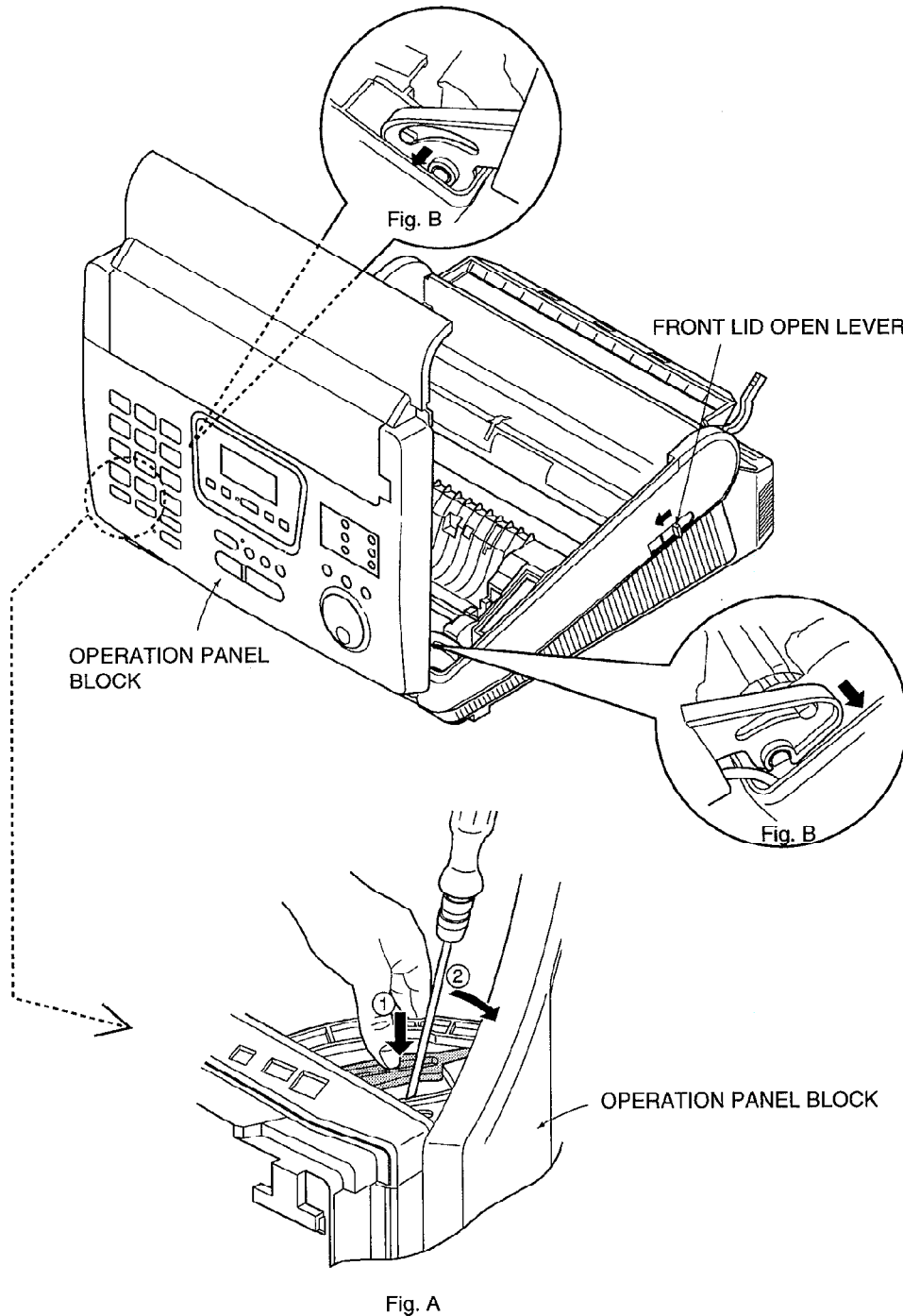
Ref. No. 1	HOW TO REMOVE THE HANDSET CRADLE, SPEAKER AND HOOK SWITCH BOARD
Procedure 1	<p>• Remove accessories, such as the cassette tray and power cord, before disassembling the unit.</p> <ol style="list-style-type: none"> 1) Remove the screw (A). 2) Remove the 2 screws (B). 3) Remove the bottom frame. (See Ref. No.5.) 4) Remove the handset cradle. 5) Remove the 3 screws (C). 6) Remove the speaker. 7) Remove the 1 screw (D). 8) Remove the connector. 9) Remove the hook switch board. 

Ref. No. 2

HOW TO REMOVE THE OPERATION PANEL BLOCK

Procedure
2

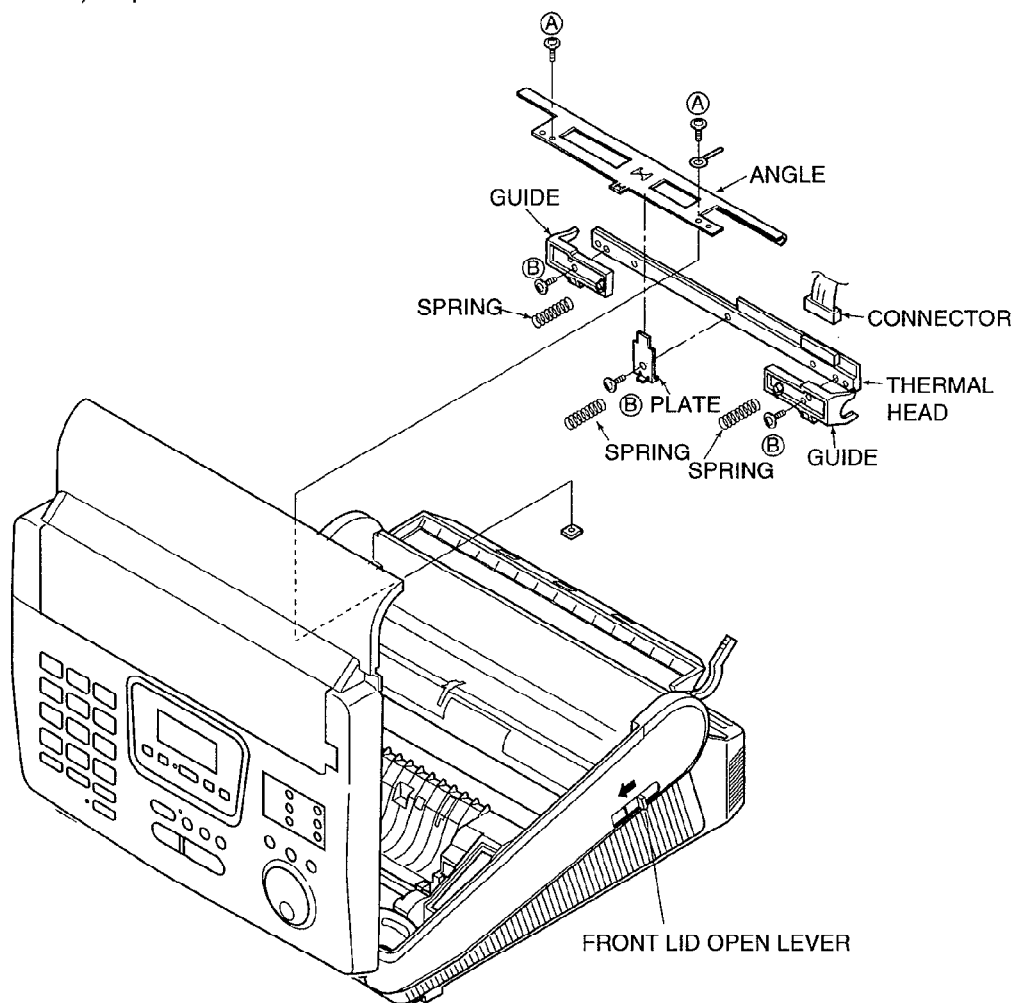
- 1) Push the front lid open lever in the direction of the arrow to open the operation panel block.
- 2) Tilt the unit on its side so that the front lid open lever side is facing down on a flat surface (ie. table). While holding down on the arm shaded grey in Fig. A ①, insert a screwdriver and remove the arm by pressing up on the arm with the screwdriver ②.
- 3) Press the arms on both sides outward. (See Fig. B.)
- 4) Remove the operation panel block.



Ref. No. 3

HOW TO REMOVE THE THERMAL HEADProcedure
3

- 1) Push the front lid open lever in the direction of the arrow to open the operation panel.
- 2) Remove the 2 screws (A).
- 3) Remove the angle.
- 4) Disconnect the connector.
- 5) Remove the thermal head block.
- 6) Remove the 3 screws (B).
- 7) Remove the 2 guides and plate.
- 8) Remove the 3 springs.
- 9) Replace the thermal head.



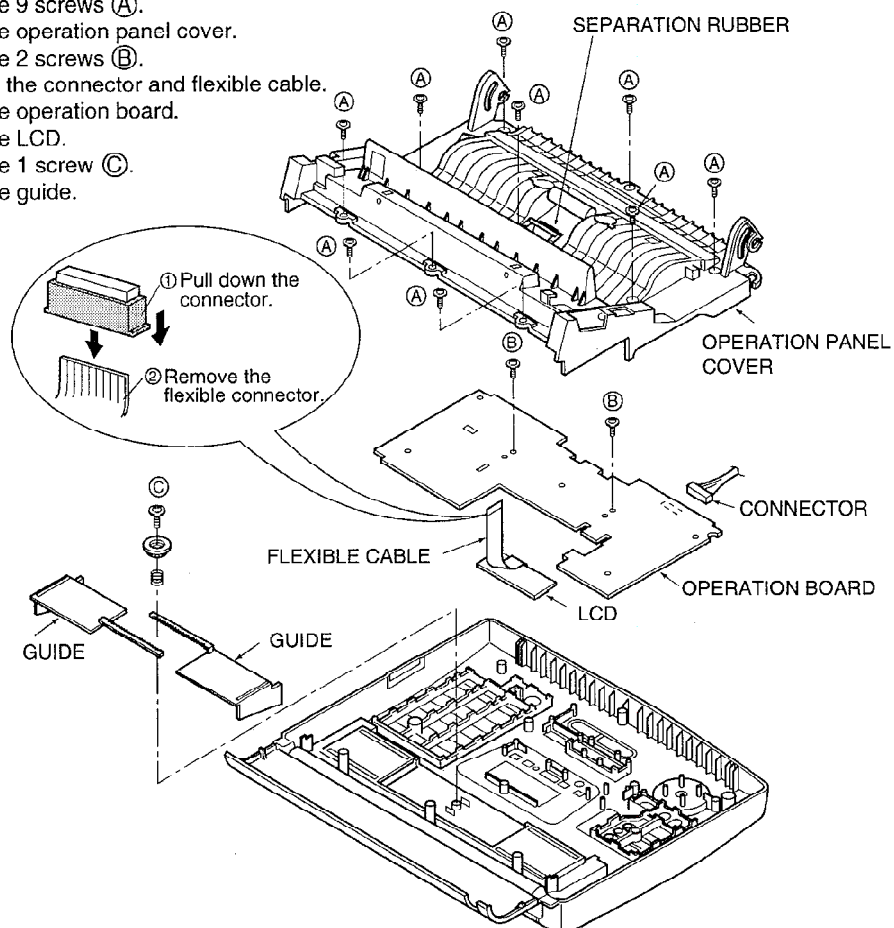
DISASSEMBLY INSTRUCTIONS

Ref. No. 4

HOW TO REMOVE THE OPERATION BOARD, LCD AND DOCUMENT GUIDE

 Procedure
2→4

- 1) Remove the 9 screws (A).
- 2) Remove the operation panel cover.
- 3) Remove the 2 screws (B).
- 4) Disconnect the connector and flexible cable.
- 5) Remove the operation board.
- 6) Remove the LCD.
- 7) Remove the 1 screw (C).
- 8) Remove the guide.

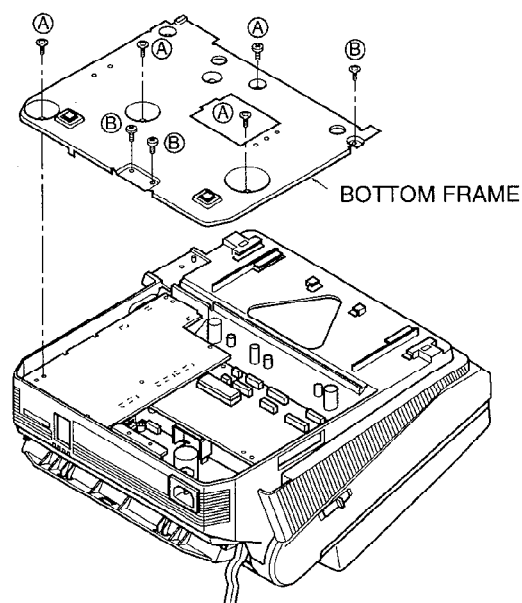


Ref. No. 5

HOW TO REMOVE THE BOTTOM FRAME

 Procedure
5

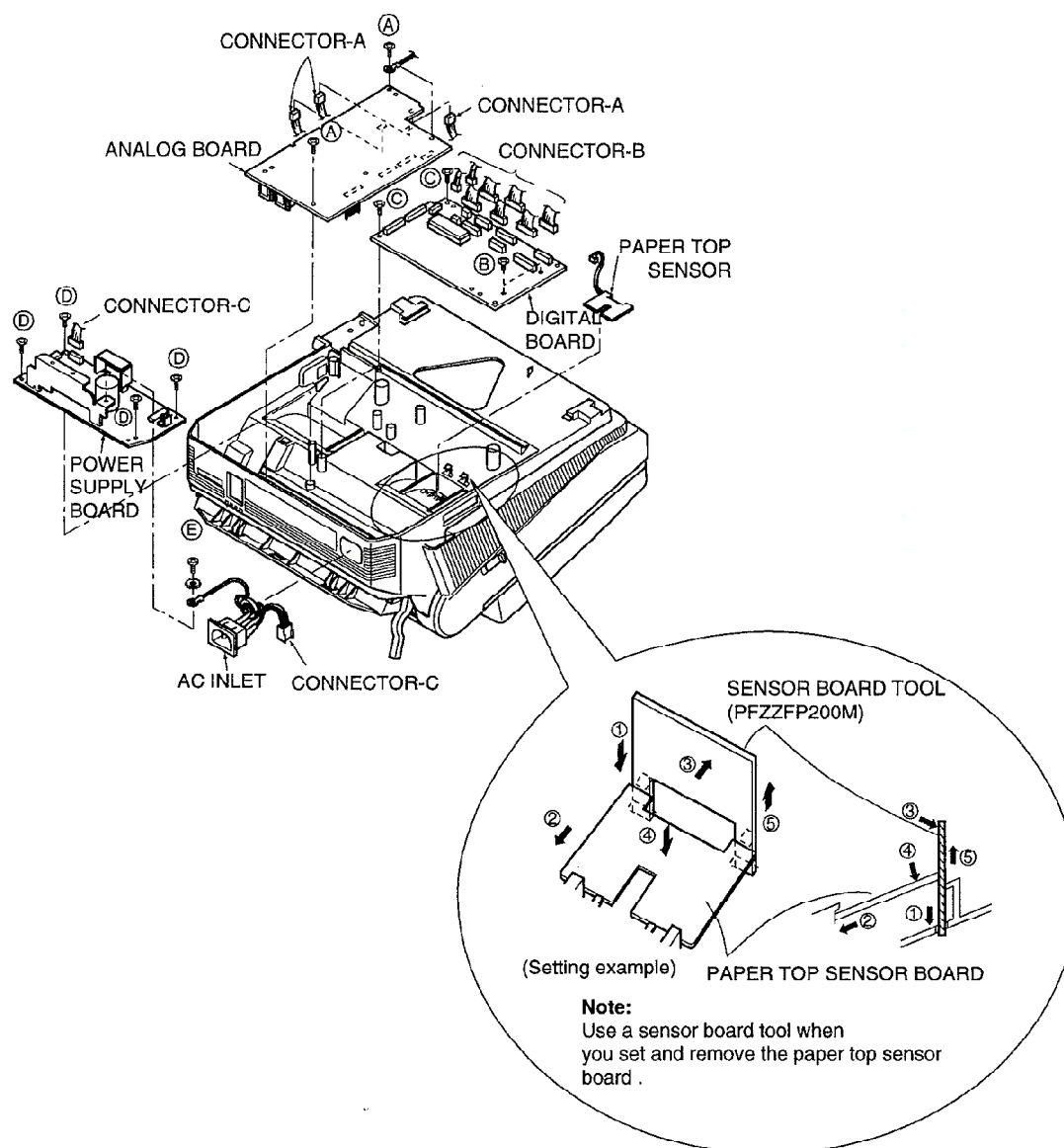
- 1) Remove the 4 screws (A).
- 2) Remove the 3 screws (B).
- 3) Remove the bottom frame.



Ref. No. 6

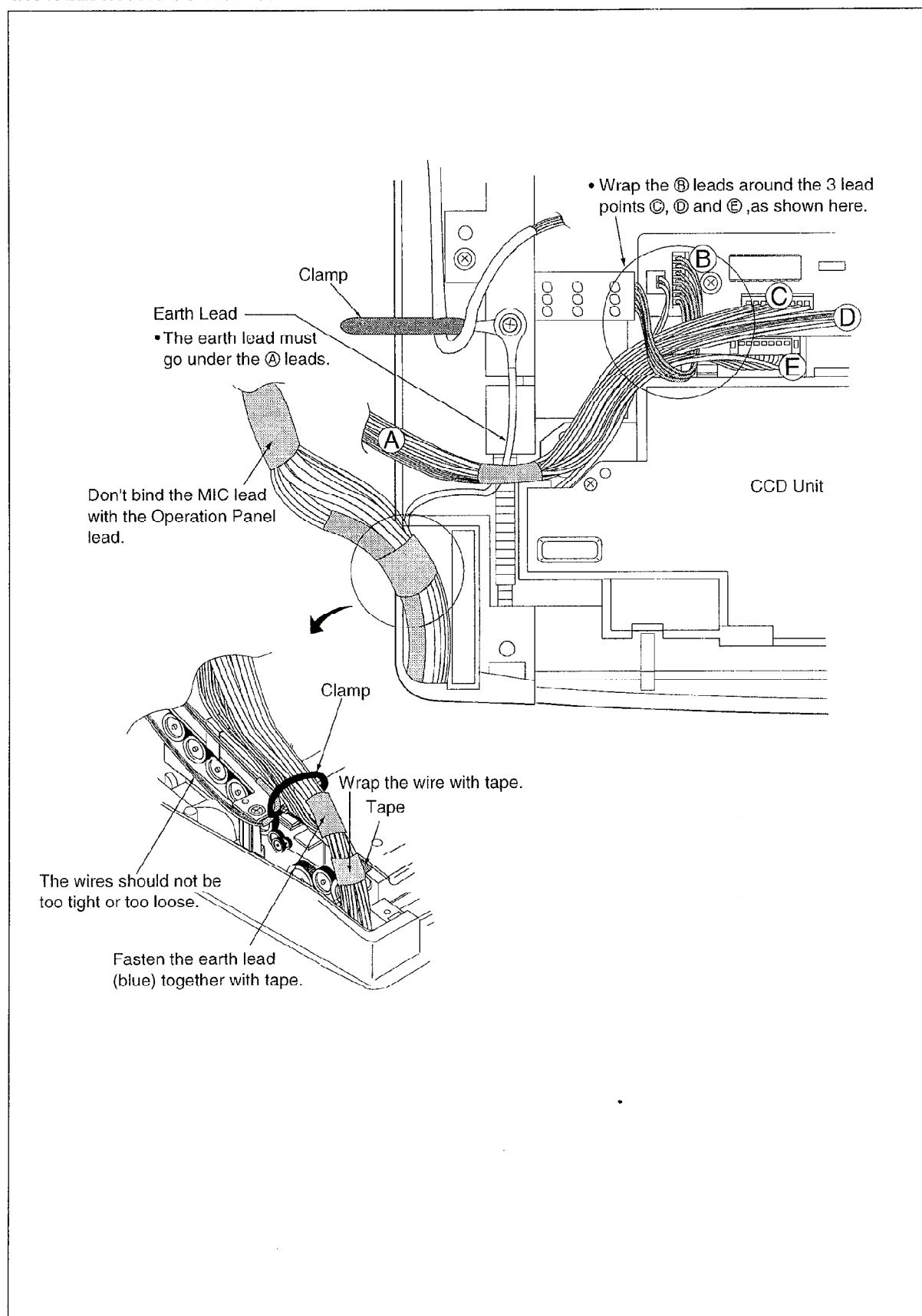
HOW TO REMOVE THE ANALOG, DIGITAL, POWER SUPPLY, PAPER TOP SENSOR BOARDS AND AC INLETProcedure
5→6

- 1) Remove the 3 screws (A).
- 2) Remove the analog board.
- 3) Disconnect the 3 connectors-A.
- 4) Remove the 8 connectors-B.
- 5) Remove the 2 screws (B).
- 6) Remove the 2 screws (C).
- 7) Remove the digital board.
- 8) Remove the 4 screws (D).
- 9) Remove the 1 screw (E).
- 10) Disconnect the 2 connectors-C.
- 11) Remove the power supply board.
- 12) Remove the AC inlet.
- 13) Remove the paper top sensor board.

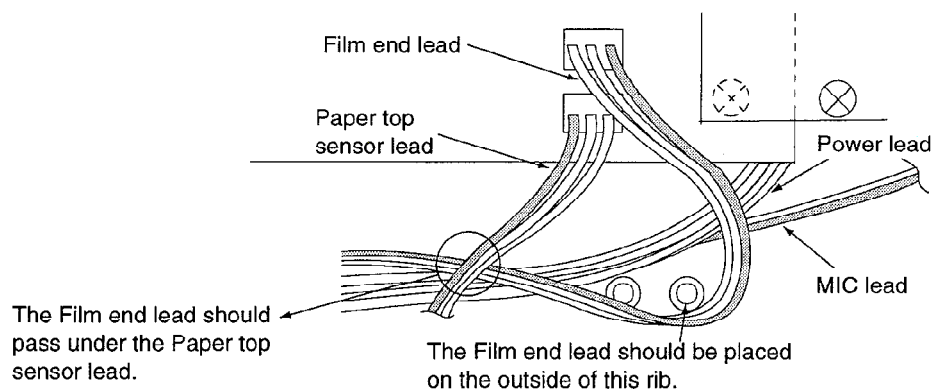
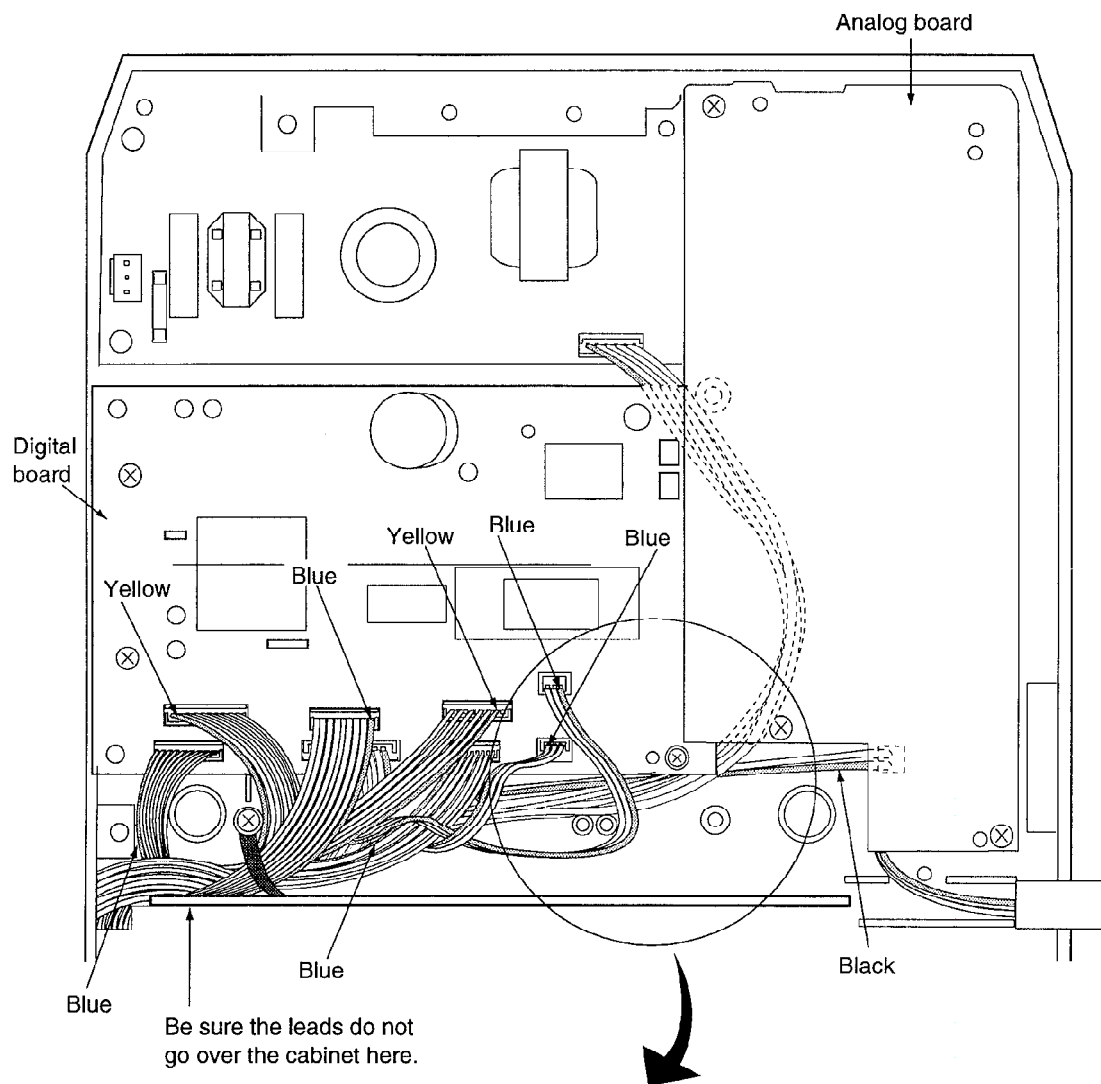


NOTE:
Refer to pages 126 and 127 for the installation position of the lead wire.

INSTALLATION POSITION OF THE LEAD WIRE



(Continued)



DISASSEMBLY INSTRUCTIONS

Ref. No. 7

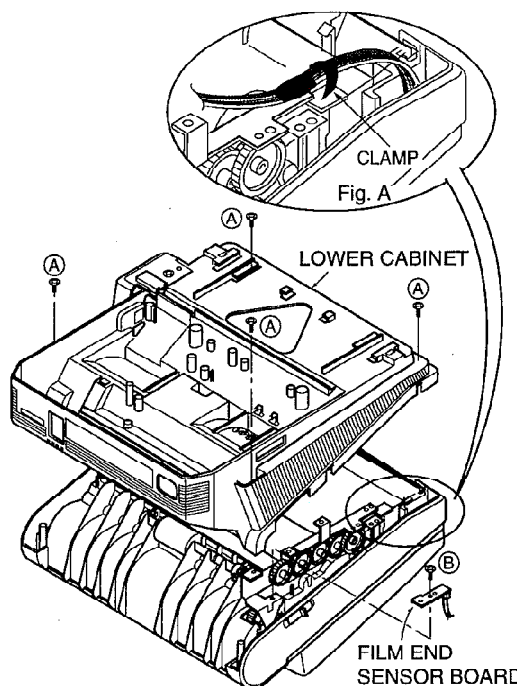
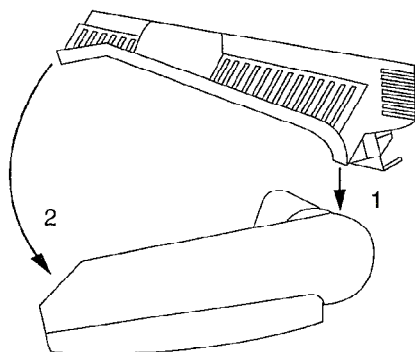
HOW TO REMOVE THE LOWER CABINET AND FILM END SENSOR BOARD

Procedure
1→5→6→7

- 1) Remove the 4 screws (A).
- 2) Remove the lower cabinet.
- 3) Remove the 1 screw (B).
- 3) Remove the film end sensor board.

NOTE:

When you close the lower cabinet, insert the back side first then set the front side.

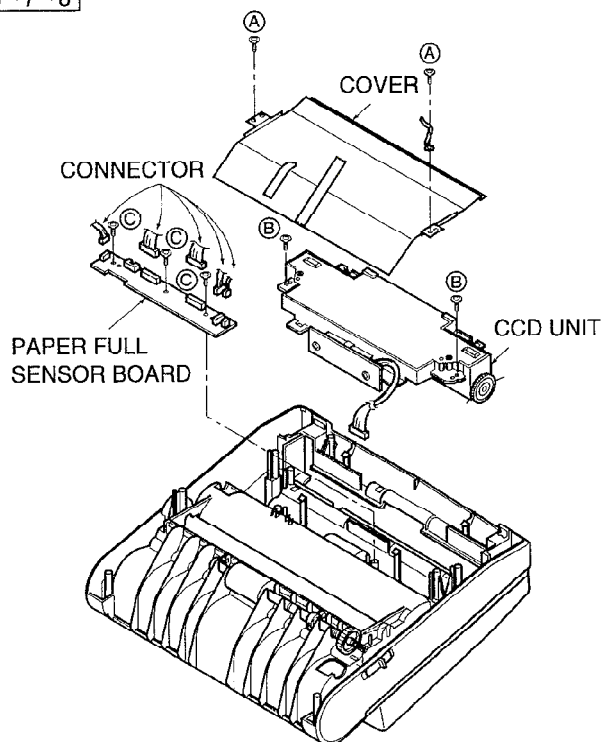


※ Before attaching the lower cabinet, attach the cables exposed from the upper cabinet to the clamp. (Fig. A)

Ref. No. 8

HOW TO REMOVE THE CCD UNIT AND PAPER FULL SENSOR BOARD

Procedure
5→6→7→8

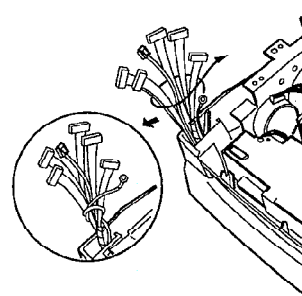


(CCD UNIT)

- 1) Remove the 2 screws (A).
- 2) Remove the cover.
- 3) Remove the 2 screws (B).
- 4) Remove the CCD UNIT.

(PAPER FULL SENSOR BOARD)

- 1) Disconnect the 5 connectors.
- 2) Remove the 3 screws (C).
- 3) Remove the paper full sensor board.



Note:

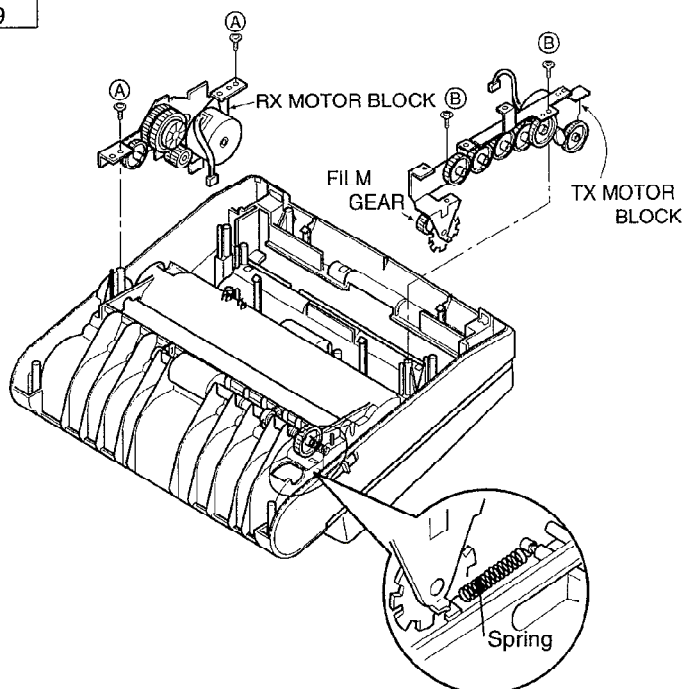
When assembling, tie the lead lines together as shown above, to prevent them from being caught in the cabinet.

HOW TO CLEAN:

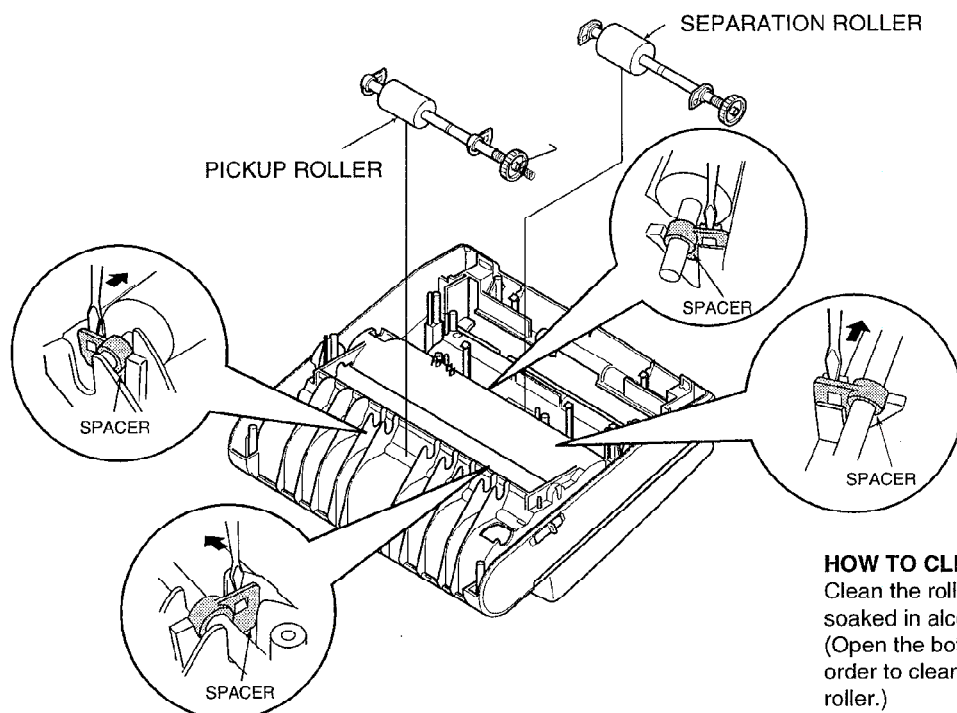
Clean the target glass on the CCD unit with a cloth soaked in alcohol.

Ref. No. 9 HOW TO REMOVE THE MOTOR BLOCK
Procedure
 5→6→7
 →8→9

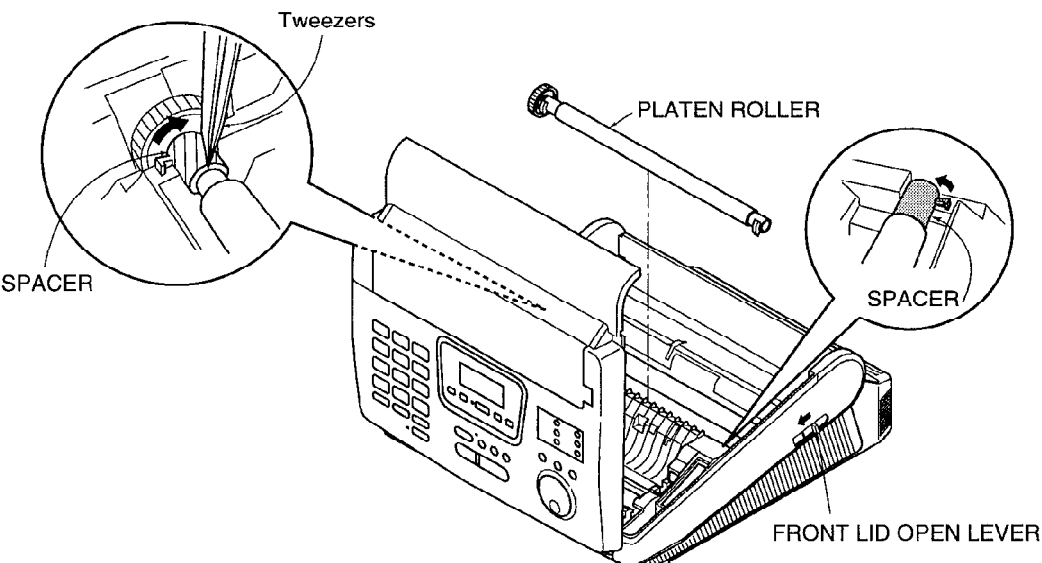
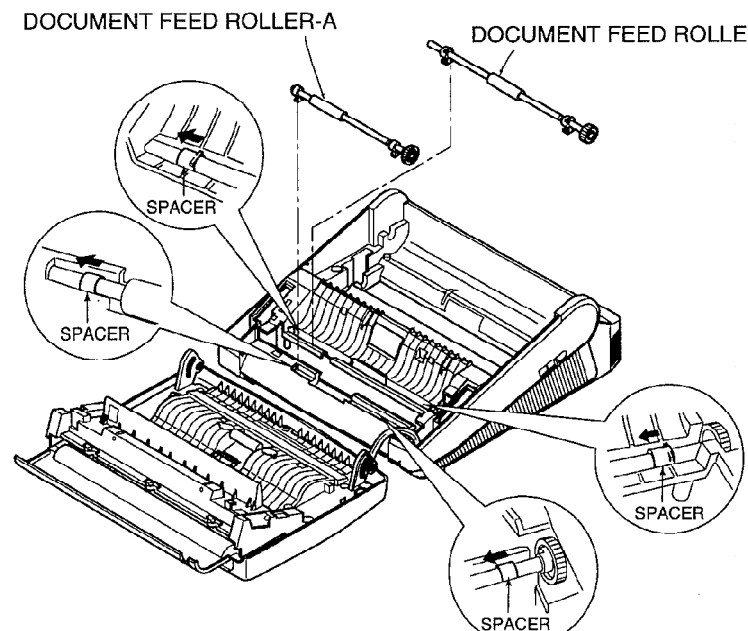
- 1) Remove the 2 screws (A).
- 2) Remove the RX motor block.
- 3) Remove the 2 screws (B).
- 4) Remove the spring.
- 5) Remove the TX motor block.


Ref. No. 10 HOW TO REMOVE THE PICKUP AND SEPARATION ROLLERS
Procedure
 5→6→7→8
 →9→10

- 1) Remove the spacer with a flat head screwdriver.
- 2) Remove the pickup roller or separation roller.
- 3) Remove the gears and spacers from the roller shaft, and replace the roller.

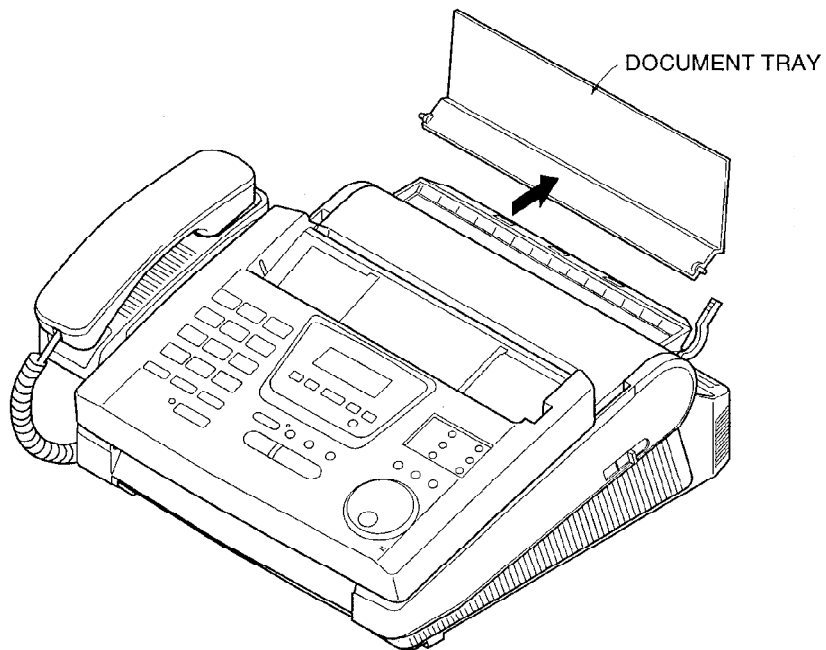


HOW TO CLEAN:
 Clean the roller with a cloth soaked in alcohol.
 (Open the bottom cabinet in order to clean the pickup roller.)

Ref. No. 11	HOW TO REMOVE THE PLATEN ROLLER
Procedure 11	<p>1) If the film cartridge is still installed, remove it. 2) Push the front lid open lever in the direction of the arrow to the operation panel. 3) Remove the spacer as shown below. 4) Remove the platen roller.</p> 
Ref. No. 12	HOW TO REMOVE THE DOCUMENT FEED ROLLER
Procedure 2→12	<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>(DOCUMENT FEED ROLLER-A)</p> <p>1) Slide both side spacers and remove the roller.</p> </div> <div style="width: 48%;"> <p>(DOCUMENT FEED ROLLER-B)</p> <p>1) Remove the RX motor block. (See Ref. No. 9.) 2) Slide the spacers and remove the roller.</p> </div> </div>  <p>HOW TO CLEAN: Clean the roller with a cloth soaked in alcohol.</p>

Ref. No. 13 **HOW TO REMOVE THE DOCUMENT TRAY**Procedure
13

- 1) Push the center section in the direction of the arrow to remove the document tray.



DISASSEMBLY INSTRUCTIONS

HOW TO REPLACE THE FLAT PACKAGE IC

If you do not have the special tools (for example, SPOT HEATER) to remove the SPOT HEATER'S Flat IC, if you have solder (large amount), a soldering iron and cutter knife, you can easily remove the ICs even if there are more than 100 pins.

1. PREPARATION

- SOLDER - - - - - Sparkle Solder 115A-1, 115B-1
OR
Almit Solder KR-19, KR-19RMA
- Soldering iron - - - - - Recommended power consumption is between 30 W to 40 W.
Temperature of Copper Rod $662 \pm 50^{\circ}\text{F}$ ($350 \pm 10^{\circ}\text{C}$)

(An expert may handle a 60~80 W iron, but a beginner might damage the foil by overheating.)

- Flux - - - - - HI115 Specific gravity 0.863

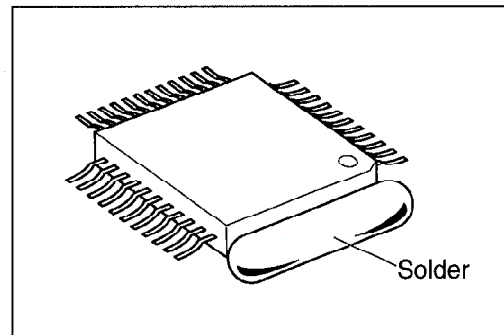
(Original flux should be replaced daily.)

2. FLAT PACKAGE IC REMOVAL PROCEDURE

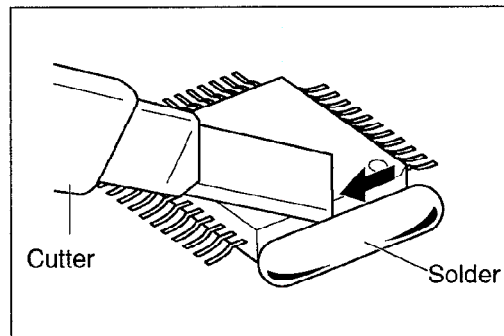
- 1) When all of the IC leads cannot be seen at the standard degree, fill with large quantities of solder.

Note:

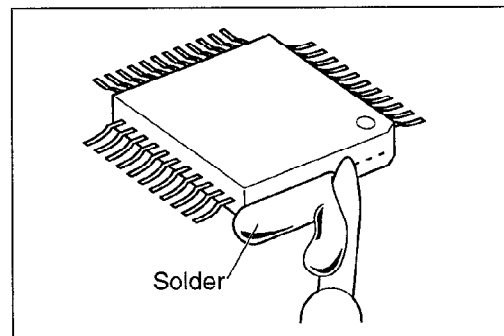
If you do not fill with solder and directly cut the IC lead with the cutter, stress may build up directly in the P.C. board's pattern. If you do not fill with large quantities of solder as in step 1, the P.C. board pattern may be removed.



- 2) Using a cutter, cut the lead at the source.
(Cut the contents with a cutter lightly, 5 or 6 times.)



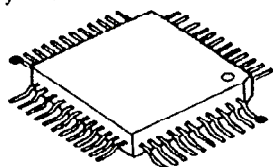
- 3) Remove when the solder melts.
(Remove the lead at the same time.)



After removing the Flat IC and when attaching a new IC, remove any of the excess solder on the land using the soldering wire, etc. If the excess solder is not removed from the land, the IC will slip and not be attached properly.

3. FLAT PACKAGE IC INSTALLATION PROCEDURE

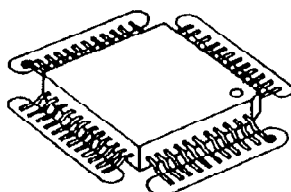
- 1) Temporarily fix the FLAT PACKAGE IC by soldering on the two marked pins.



● - - - - - Temporary soldering point.

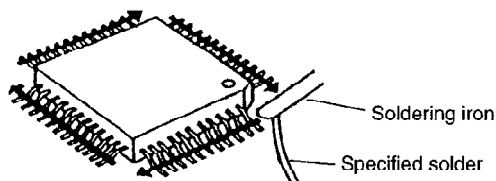
*Check the accuracy of the IC setting with the corresponding soldering foil.

- 2) Apply flux to all pins of the FLAT PACKAGE IC.



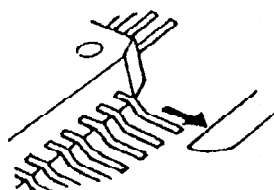
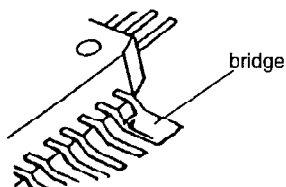
○ - - - - - Flux

- 3) Solder using the specified solder, in the direction of the arrow, by sliding the soldering iron.



4. BRIDGE MODIFICATION PROCEDURE

- 1) Lightly resolder the bridged portion.
- 2) Remove the remaining solder along the pins using a soldering iron as shown in the figure below.



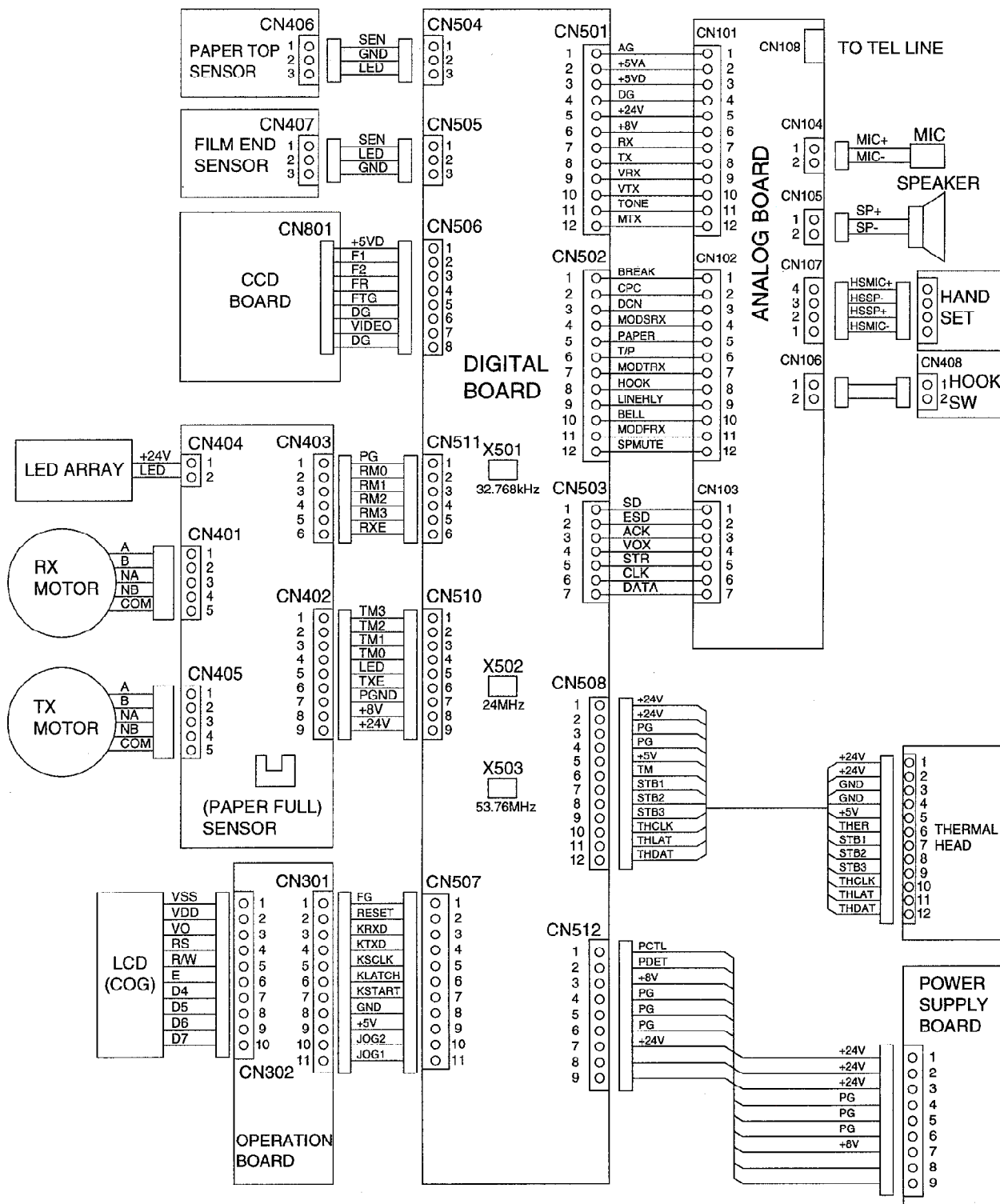
KX-FP270

MEMO

CIRCUIT OPERATIONS

	Page
1. Connection Diagram	136
2. General Block Diagram	137, 138
3. Control Section	139~149
4. Facsimile Section	149~161
5. MODEM Section	162~168
6. Description of the Analog Section Block Diagram	169, 170
7. NCU Section	171, 172
8. ITS and Monitor Section	173, 174
9. ATAS Section	175
10. Analog Gate Array	176, 177
11. Operation Board Section	178
12. LCD Section	179
13. Power Supply Board Switching Section	180~182

1.CONNECTION DIAGRAM

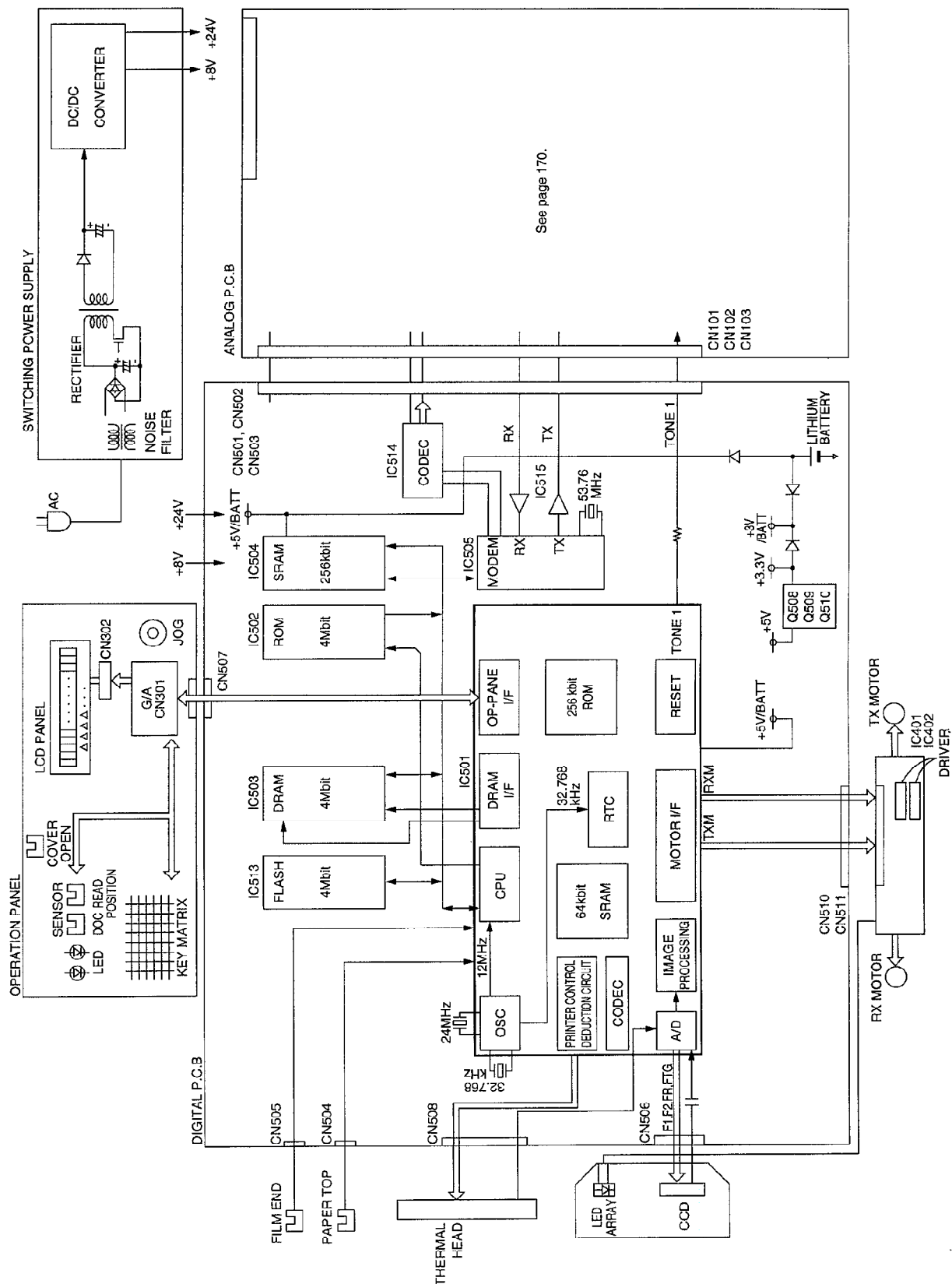


2. GENERAL BLOCK DIAGRAM

The control section will be explained as shown in the block diagram.

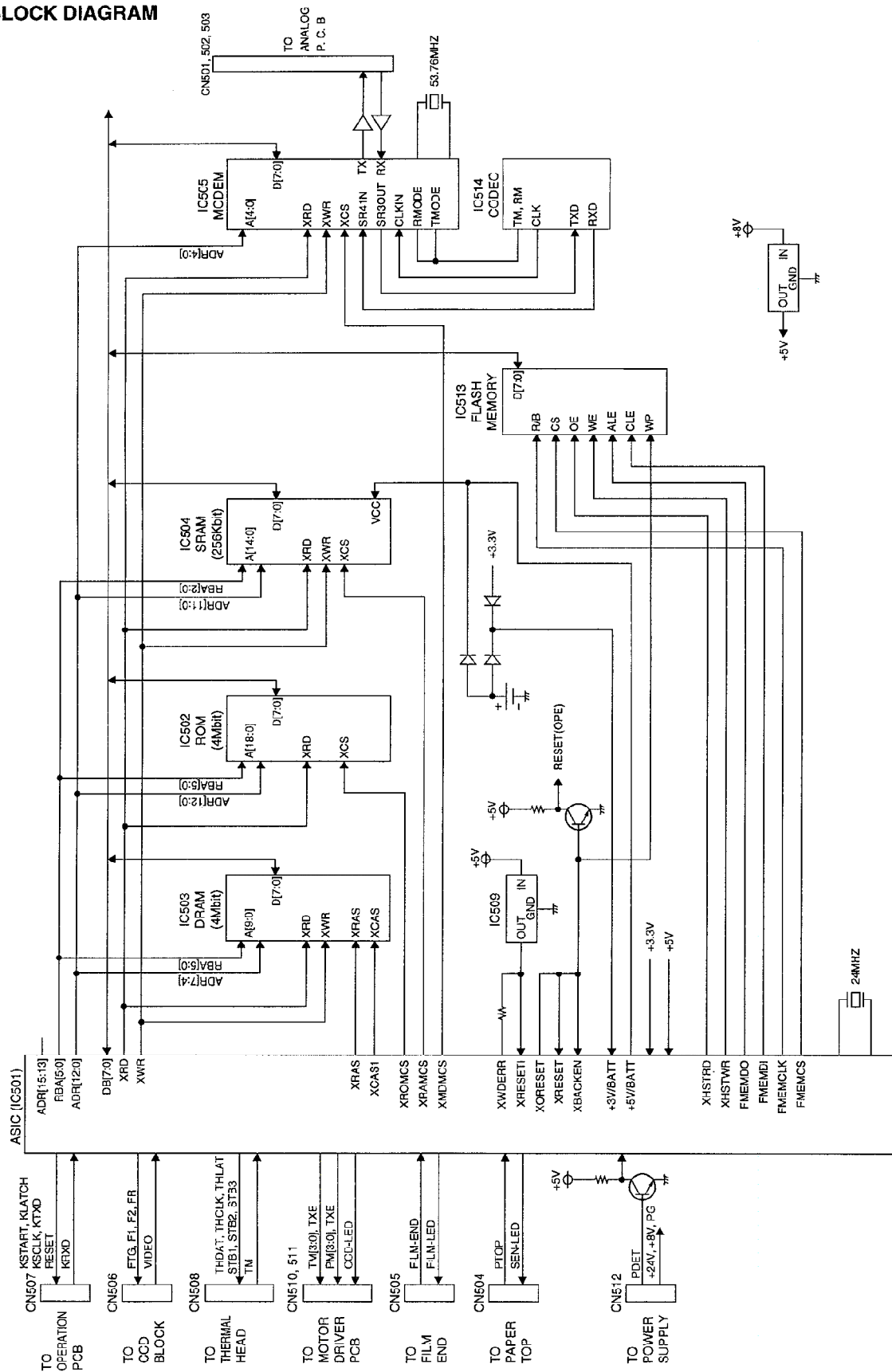
- | | |
|--|--|
| 1) ASIC (IC501) | Composed mainly of an address decoder and modem control section.
Controls the general FAX operations.
Controls the operation panel I/F.
Controls the thermal head I/F and CCD I/F.
Executes image processing.
CPU and Real time clock
Provides the reset pulse to each of the major ICs. |
| 2) ROM (IC502) | Contains all of the program instructions for unit operations. |
| 3) Static RAM (IC504) | This memory is used mainly for the parameter working storage area. |
| 4) Dynamic RAM (IC503) | This memory is used mainly for the parameter working storage area. |
| 5) MODEM (IC505) | Executes modulation and demodulation for FAX communication. |
| 6) Read Section | CCD image sensor to read transmitting documents. |
| 7) Motor Driver (IC401,IC402) | Drives the transmission motor and the reception motor. |
| 8) Thermal Head | Contains heating elements for dot matrix image printing. |
| 9) Analog Board | Composed of an ITS circuit and NCU circuit. |
| 10) Sensor Section | Composed of a cover open sensor, document sensor, read position sensor,
set paper switch, paper full sensor, paper top sensor and film end sensor. |
| 11) Power Supply Board Switching Section | Supplies +8V and +24V to the unit. |
| 12) Flash Memory (IC513) | This memory is used for voice prompt and TAM. |

General Block Diagram



3. CONTROL SECTION

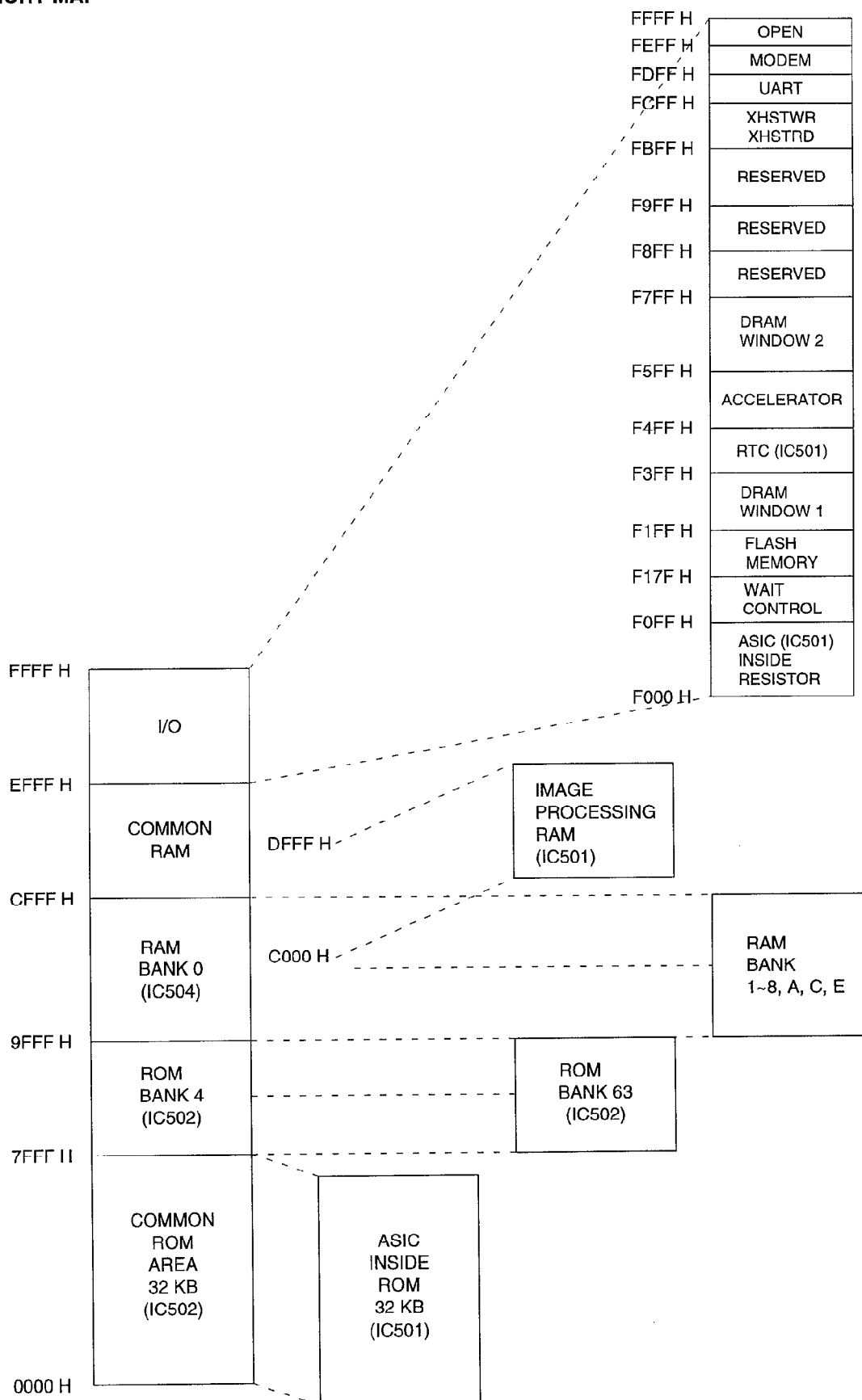
3.1 BLOCK DIAGRAM



CIRCUIT OPERATIONS

KX-FP270

3.2 MEMORY MAP



3.3 ASIC (IC501)

This custom IC is used for general FAX operations.

- | | |
|--------------------------|---|
| (1) CPU: | This model uses a Z80 equivalent CPU operating at 12 MHz.
Many of the peripheral functions are handled by custom designed LSIs.
As a result, the CPU only needs to process the results. |
| (2) RTC: | Real time clock. |
| (3) DECODER: | Decodes the address. |
| (4) ROM/RAM I/F: | Controls the SELECT signal of ROM or RAM and bank switching. |
| (5) CCD I/F: | Controls document reading. |
| (6) IMAGE DATA RAM: | This is inside the ASIC and has 8 KB which is used for image processing. |
| (7) THERMAL HEAD I/F: | Transmits the recorded data to the thermal head. |
| (8) MOTOR I/F: | Controls the transmission motor which feeds the document.
Controls the receiving motor which feeds the recording paper. |
| (9) OPERATION PANEL I/F: | Serial interface with Operation Panel. |
| (10) I/O PORT: | I/O Port Interface. |
| (11) ANALOG UNIT: | Electronic volume for the handset and monitor.
Sends beep tones, etc. |

This memory is built-in to the ASIC (IC501) to be used for image processing.
The memory map of the Image Data RAM is shown below.

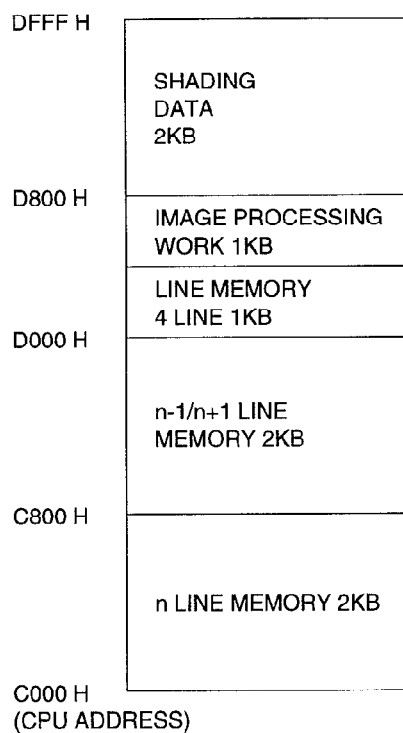


Fig. A

3.4 ROM (IC502)

This 512 KB ROM (EPROM or MASKROM) has 32 KB of common area and bank area (BK4~BK63).

The capacity of each bank is 8 KB.

The addresses of the common area are from 0000H to 7FFFH, and addresses 8000H to 9FFFH are for the bank area.

3.5 STATIC RAM (IC504)

This 32 KB RAM has 8 KB of common area and bank area (BK0~BK8, A, C, E).

The capacity of each bank is 12 KB.

The addresses of the common area are from D000H to EFFFH, and the addresses A000H to CFFFH are for the bank area.

3.6 DYNAMIC RAM (IC503)

The DRAM is used for CPU work and receiving memory.

The address is F200H~F3FFH (DRAM access window 1) and F600H~F7FFH (DRAM access window 2).

Explanation of Pin Distribution (IC501)

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	EXPLANATION
1	AIN1	A	3.3V	CCD IMAGE SIGNAL INPUT
2	AIN2	A	3.3V	THERMISTOR TEMPERATURE WATCH INPUT
3	AMON	A	3.3V	ANALOG SIGNAL MONITOR TERMINAL
4	VSSB		GND	POWER SOURCE (ANALOG GND)
5	Vddb		3.3V	POWER SOURCE (ANALOG +3.3V)
6	VDD (3.3V/B)		3.3V/BATT	POWER SOURCE (+3.3V/LITHIUM BATTERY)
7	X32OUT	O	3.3V/BATT	RTC (32.768KHz) CONNECTION
8	X32IN	I	3.3V/BATT	RTC (32.768KHz) CONNECTION
9	VSS		GND	GND
10	XBACEN	I	5V/BATT	BACKUP ENABLE
11	VDD (5V/B)		5V/BATT	POWER SOURCE (+5V/LITHIUM BATTERY)
12	XRAMCS	O	5V/BATT	RAM (IC504) CHIP SELECT
13	FTG	O	5V	SH SIGNAL OUTPUT FOR CCD
14	F1	O	5V	01 SIGNAL OUTPUT FOR CCD
15	F2	O	5V	02 SIGNAL OUTPUT FOR CCD
16	FR	O	5V	RS SIGNAL OUTPUT FOR CCD
17	VIDRST	I	5V	INPUT PORT (ESD)
18	SPHCLK	I	5V	INPUT PORT (VOX)
19	DAHKON	O	5V	OUTPUT PORT (MODSRX)
20	ADSEL2	I	5V	INPUT PORT (SD)
21	CPC	I	5V	INPUT PORT (DCN)
22	BELL	O	5V	OUTPUT PORT (CCD LED ON)
23	VDD (5V)		5V	POWER SOURCE (+5V)
24	VSS		GND	POWER SOURCE (GND)
25	RVN	I	5V	INPUT PORT (FILM END SENSOR SIGNAL)
26	TXD	O	5V	NOT USED
27	RXD	O	5V	NOT USED
28	XRTS	O	5V	NOT USED
29	XCTS	O	5V	NOT USED
30	XDSR	O	5V	NOT USED
31	DCD	O	5V	NOT USED
32	XDTR	O	5V	NOT USED
33	RI	O	5V	-----
34	TONE1		5V	TONE OUTPUT
35	TONE2		5V	NOT USED
36	VOL1		5V	NOT USED
37	VOL2		5V	NOT USED
38	VOL3		5V	NOT USED
39	MIDAT	O	5V	ANALOG ASIC I/F (DATA)
40	MICLK	O	5V	ANALOG ASIC I/F (CLK)
41	MILAT	O	5V	ANALOG ASIC I/F (LATCH)
42	XRESCS1	O	5V	OUTPUT PORT (BREAK)
43	XRESCS2	O	5V	OUTPUT PORT (MODEM RESET)
44	VSS		GND	POWER SOURCE (GND)
45	VDD (5V)		5V	POWER SOURCE (+5V)
46	XNMI	I	5V	HIGH FIXED
47	CBUSY2	O	5V	OUTPUT PORT (LINE RLY)
48	CSO	O	5V	OUTPUT PORT (CCD ON)
49	CBUSY1	I	5V	INPUT PORT (JOG1)
50	CCLK	I	5V	INPUT PORT (JOG2)
51	CSI	I	5V	INPUT PORT (VOX)
52	XMDMINT	I	5V	MODEM INTERRUPT
53	XMDMCS	O	5V	MODEM CHIP SELECT

KX-FP270

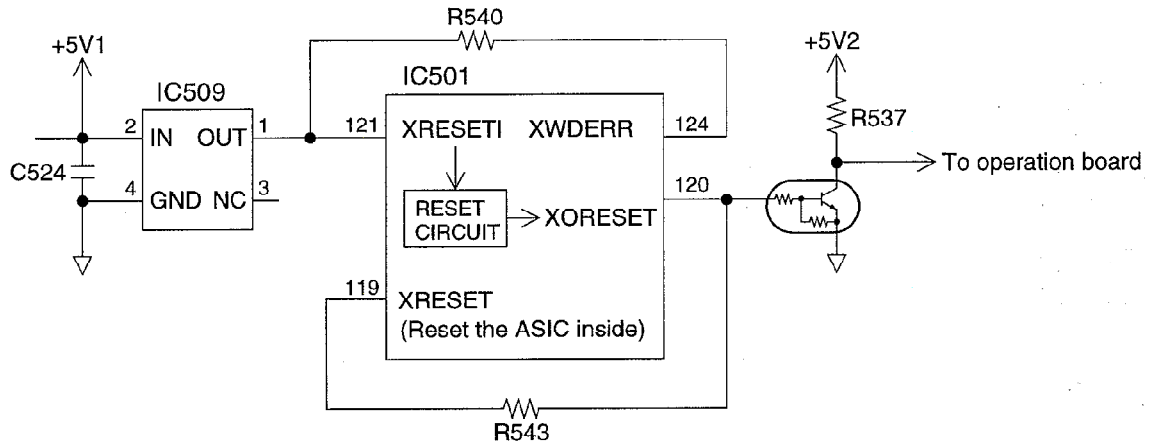
NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	EXPLANATION
54	XRESCS3	O	5V	OUTPUT PORT (FILM SENSOR LED ON)
55	20KOSC	I/O	5V	NOT USED
56	XHOLDAK	O	5V	NOT USED
57	VDD (3.3V)		3.3V	POWER SOURCE (+3.3V)
58	XOUT	O	3.3V	SYSTEM CLOCK (24MHz)
59	XIN	I	3.3V	SYSTEM CLOCK (24MHz)
60	VSS		GND	POWER SOURCE (GND)
61	VDD (5V)		5V	POWER SOURCE (+5V)
62	XTEST	O	5V	24MHz CLOCK
63	CPUCLK	O	5V	NOT USED
64	TEST1	I	5V	HIGH FIXED
65	TEST2	I	5V	HIGH FIXED
66	TEST3	I	5V	HIGH FIXED
67	TEST4	I	5V	HIGH FIXED
68	XWAIT	I	5V	LOW FIXED
69	HOLD	I	5V	LOW FIXED
70	VSS		GND	POWER SOURCE (GND)
71	VDD (3.3V)		3.3V	POWER SOURCE (3.3V)
72	HSTRD	O	5V	FLASH MEMORY READ
73	HSTWR	O	5V	FLASH MEMORY WRITE
74	XOPRBE	O	5V	OUTPUT PORT (ACK)
75	ADR15	O	5V	CPU ADDRESS BUS 15 (NOT USED)
76	ADR14	O	5V	CPU ADDRESS BUS 14 (NOT USED)
77	ADR13	O	5V	CPU ADDRESS BUS 13 (NOT USED)
78	XRAS	O	5V	DRAM (IC503) ROW ADDRESS STROBE
79	XCAS1	O	5V	DRAM (IC503) CULUM ADDRESS STROBE
80	XCAS2	O	5V	OUTPUT PORT (PCTL)
81	DB3	I/O	5V	CPU DATA BUS 3
82	DB2	I/O	5V	CPU DATA BUS 2
83	DB4	I/O	5V	CPU DATA BUS 4
84	DB1	I/O	5V	CPU DATA BUS 1
85	DB5	I/O	5V	CPU DATA BUS 5
86	DB0	I/O	5V	CPU DATA BUS 0
87	DB6	I/O	5V	CPU DATA BUS 6
88	DB7	I/O	5V	CPU DATA BUS 7
89	XROMCS	I/O	5V	ROM (IC502) CHIP SELECT
90	VSS		GND	POWER SOURCE (GND)
91	VDD (5V)		5V	POWER SOURCE (+5V)
92	RD	O	5V	CPU RD
93	WR	O	5V	CPU WR
94	ADR0	O	5V	CPU ADDRESS BUS 0
95	ADR1	O	5V	CPU ADDRESS BUS 1
96	ADR2	O	5V	CPU ADDRESS BUS 2
97	ADR3	O	5V	CPU ADDRESS BUS 3
98	ADR4	O	5V	CPU ADDRESS BUS 4
99	ADR5	O	5V	CPU ADDRESS BUS 5
100	ADR6	O	5V	CPU ADDRESS BUS 6
101	ADR7	O	5V	CPU ADDRESS BUS 7
102	ADR8	O	5V	CPU ADDRESS BUS 8
103	ADR9	O	5V	CPU ADDRESS 9
104	ADR10	O	5V	CPU ADDRESS 10
105	ADR11	O	5V	CPU ADDRESS 11
106	ADR12	O	5V	CPU ADDRESS 12

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	EXPLANATION
107	RBA0	O	5V	ROM/RAM BANK ADDRESS 0
108	VSS		GND	POWER SOURCE (GND)
109	VDD (5V)		5V	POWER SOURCE (+5V)
110	RBA1	O	5V	ROM/RAM BANK ADDRESS 1
111	RBA2	O	5V	ROM/RAM BANK ADDRESS 2
112	RBA3	O	5V	ROM/RAM BANK ADDRESS 3
113	RBA4	O	5V	ROM/RAM BANK ADDRESS 4
114	RBA5	O	5V	ROM/RAM BANK ADDRESS 5
115	FMEMCS	O	5V	OUTPUT PORT (FCS)
116	FMEMDO	O	5V	OUTPUT PORT (ALE)
117	FMEMDI	O	5V	OUTPUT PORT (CLE)
118	FMEMCLK	I	5V	INPUT PORT (R/B)
119	XRESET	I	5V	RESET INPUT
120	XORESET	O	5V	RESET OUTPUT
121	XRESETI	I	5V	RESET INPUT
122	VDD (5V)		5V	POWER SOURCE (+5V)
123	VSS		GND	POWER SOURCE (GND)
124	WDERR	O	5V	WATCHED ERROR OUTPUT SIGNAL
125	IOP	O	5V	THERMAL HEAD POWER ON/OFF CONTROL
126	RM0	O	5V	RECEIVE MOTOR A PHASE
127	RM1	O	5V	RECEIVE MOTOR B PHASE
128	RM2	O	5V	RECEIVE MOTOR /A PHASE
129	RM3	O	5V	RECEIVE MOTOR /B PHASE
130	RXE	O	5V	RECEIVE MOTOR ENABLE SIGNAL
131	TMO	O	5V	TRANSFER MOTOR A PHASE
132	VDD (3.3V)		3.3V	POWER SOURCE (3.3V)
133	VSS		GND	POWER SOURCE (GND)
134	TM1	O	5V	TRANSFER MOTOR B PHASE
135	TM2	O	5V	TRANSFER MOTOR /A PHASE
136	TM3	O	5V	TRANSFER MOTOR /B PHASE
137	TXE	O	5V	TRANSFER MOTOR ENABLE SIGNAL
138	STB1	O	5V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
139	STB2	O	5V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
140	STB3	O	5V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
141	STB4	O	5V	NOT USED
142	VDD (5V)		5V	POWER SOURCE (+5V)
143	VSS		GND	POWER SOURCE (GND)
144	STBNP	I	5V	INPUT PORT (CPC)
145	THDAT	O	5V	RECORDED IMAGE OUTPUT
146	THCLK	O	5V	CLOCK OUTPUT FOR DATA TRANSFER
147	THLAT	O	5V	PULSE OUTPUT FOR DATA LATCH
148	KSTART	O	5V	OPERATION PANEL CONTROL
149	KLATCH	O	5V	OPERATION PANEL CONTROL
150	KSCLK	O	5V	OPERATION PANEL CONTROL
151	KTXD	O	5V	OPERATION PANEL CONTROL
152	KRXD	I	5V	OPERATION PANEL CONTROL
153	ADSEL1	O	5V	CHANNEL SELECT SIGNAL FOR AIN2
154	VSSC		GND	POWER SOURCE (ANALOG GND)
155	VDDC		3.3V	POWER SOURCE (ANALOG +3.3V)
156	VSSA		GND	POWER SOURCE (ANALOG GND)
157	VDDA		3.3V	POWER SOURCE (ANALOG +3.3V)
158	VREFB	A	3.3V	A/D CONVERTER'S ZERO STANDARD VOLTAGE OUTPUT
159	VCL	A	3.3V	ANALOG PART STANDARD VOLTAGE SIGNAL
160	VREFT	A	3.3V	A/D CONVERTER'S FULL SCALE VOLTAGE OUTPUT

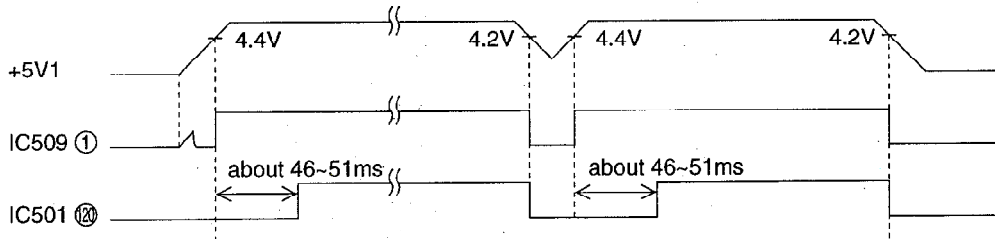
3.8 RESET CIRCUIT (WATCH DOG TIMER)

The output signal from pin 1 of the voltage detect IC (IC509) is input to the ASIC (IC501) 121 pin. Then the output signal from pin 120 of the ASIC (IC501) resets the ASIC, the MODEM (IC505) and the gate array (IC301) on the operation board.

Circuit Diagram



- (1) During a momentary power interruption, a positive reset pulse of 46~51 msec is generated and the system is reset completely.



- (2) When pin 119 and 120 of IC501 become low level, they will prohibit the SRAM (IC503) from changing data. The SRAM (IC504) will go into the backup mode, when they are backed up by a lithium battery.

- (3) The watch dog timer, built-in the ASIC (IC501), is initialized by the CPU about every 1.5 ms. When a watch dog error occurs, pin 124 of the ASIC (IC501) becomes low level. The terminal of the \overline{WDERR} signal is connected to the reset line, so the \overline{WDERR} signal works as the reset signal.

3.9 SRAM AND RTC BACK UP CIRCUIT

1) Function

This unit has a lithium battery (BATT) which works for the SRAM (IC504) and Real Time Clock IC (RTC: inside IC501). The user parameters for autodial numbers, the system setup data and so on are stored in the SRAM (IC504). The RTC continues functioning, even when the power switch is OFF, backed up by a lithium battery.

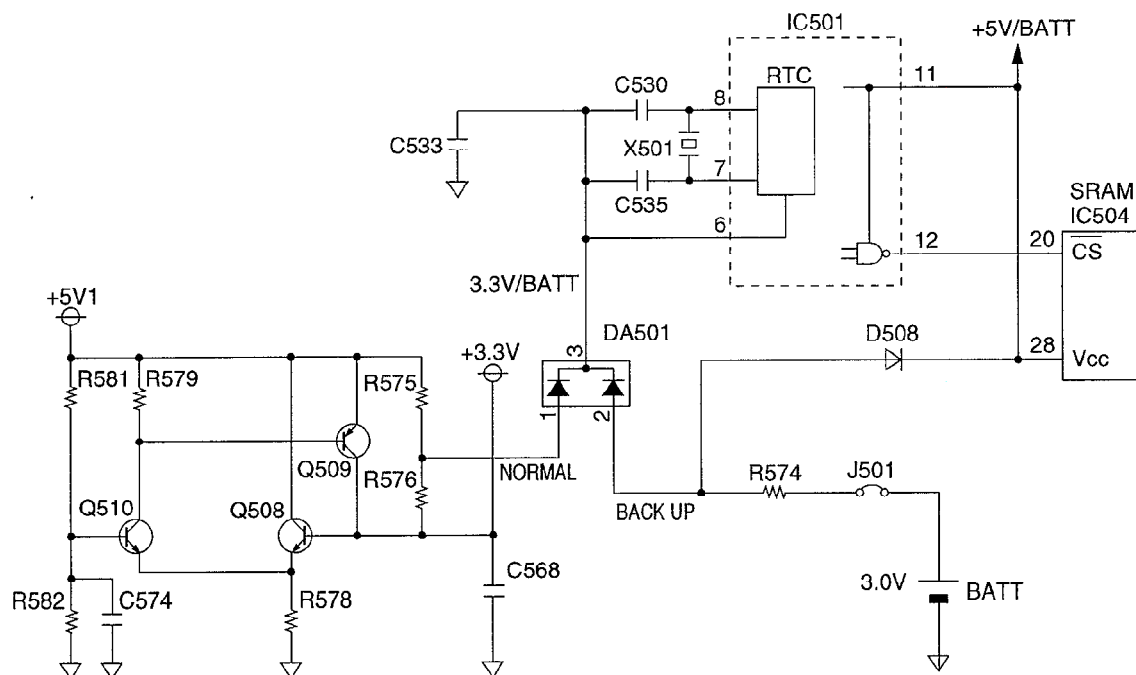
2) SRAM (IC504) Backup Circuit Operation

When the power switch is turned ON, power is supplied through pin 11 of IC501 to the SRAM (IC504). At this time, the voltage at pin 28 of the SRAM is 5V. When the power switch is turned OFF, the BATT supplies power to the SRAM through J501, R574 and D508. The voltage at pin 28 of the SRAM is about +2.5V. When the power switch is OFF and the voltage of +5V decreases, the voltage detect IC (IC509) outputs " Low " level and the IC501 outputs the reset signal. Pin 28 of the SRAM becomes roughly the same voltage as the battery voltage. At this point, pin 20 (CS) of IC504 becomes high level, causing the SRAM to go into the backup mode, in which the power consumption is lower.

3) RTC Inside (IC501) Backup Circuit Operation

When the power switch is turned ON, power is supplied through DA501 to the RTC (inside IC501). At this time, the voltage at pin 6 of the IC501 is +3.3V. When the power switch is turned OFF, the BATT supplies power to RTC through DA501. The voltage at pin 6 of IC501 is about +2.5V. When the power switch is OFF and the voltage of +3.3V decreases, pin 6 of RTC (IC501) becomes roughly the same voltage as the battery voltage. RTC goes into the backup mode, in which the power consumption is lower.

Circuit Diagram



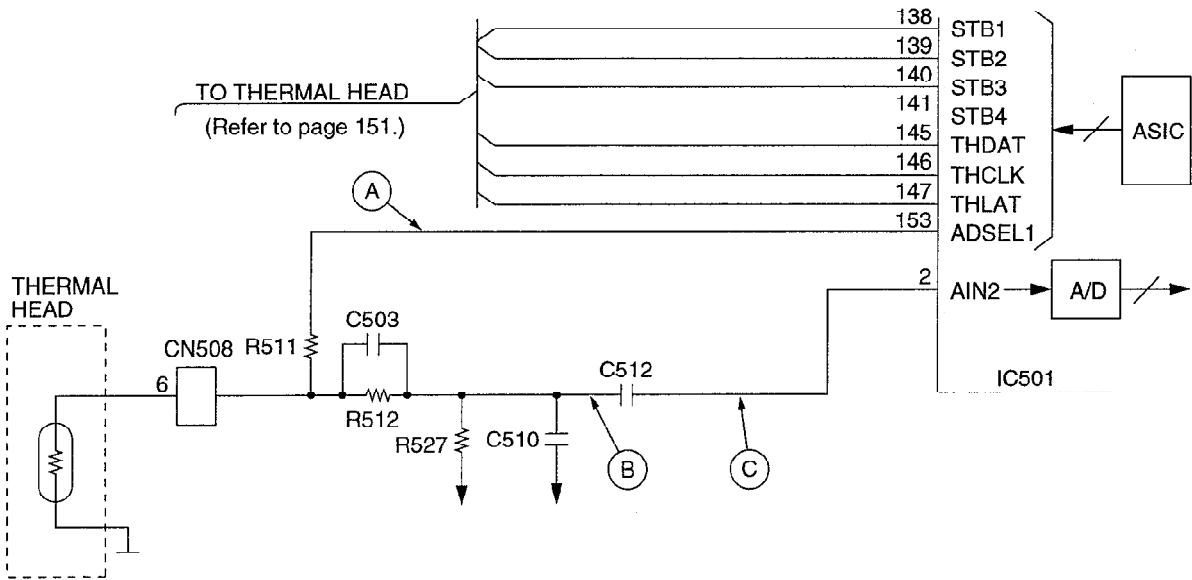
3.10 SUPERVISION CIRCUIT FOR THE THERMAL HEAD TEMPERATURE

1) Function

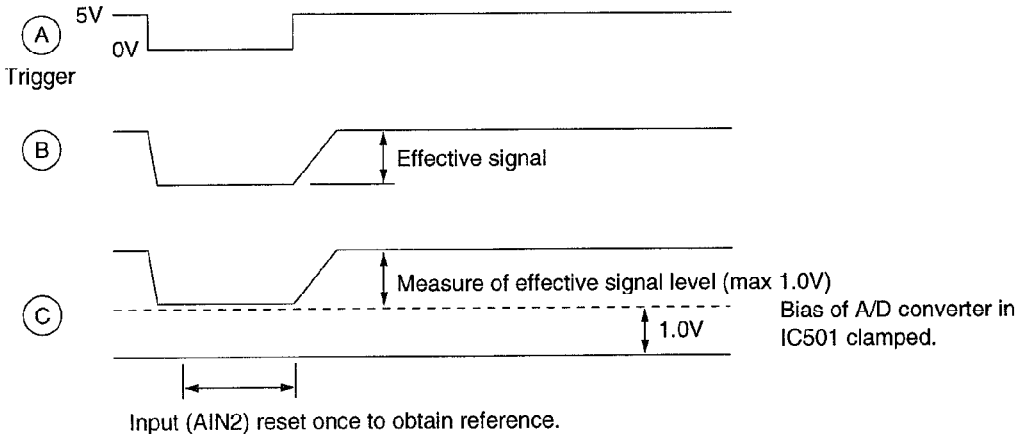
The thermistor changes the resistor according to the temperature and uses the thermistor's characteristics. The output of pin 153 of IC501 becomes a low level. Then when it becomes a high level, it triggers point ㉠. In point ㉢, according to the voltage output time, the thermal head's temperature is detected.

After the thermal head temperature is converted to voltage in ⑤, it is then changed to digital data in the A/D converter inside IC501. The CPU decides the strobe width of the thermal head according to this value. Therefore, this circuit can keep the thermal head at an even temperature in order to stabilize the printing density and prevent the head from being overheated.

Circuit Diagram



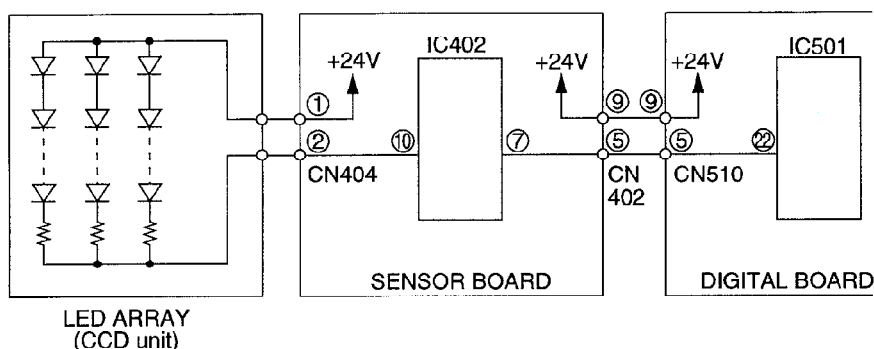
Timing Chart



3.11 LED ARRAY

The LED ARRAY will light during transmission and copying as a light source to recognize document characters, patterns, or graphics on a document. Pin 22 of IC501 is low level while the LED array is lit. It is also possible to light the LED ARRAY in the test mode (SCAN CHECK: Refer to page 105.).

Circuit Diagram



4. FACSIMILE SECTION

4.1 IMAGE DATA FLOW DURING FACSIMILE OPERATION

COPY (Fine, Super-Fine, Half Tone)

- 1) White plate information is read by the CCD (to be used as the reference white level) via route ①, and the result is input to IC501. Refer to the block diagram on the following page.
- 2) In IC501, the data is adjusted to a suitable level for A/D conversion in the Analog Signal Processing Section, and via route ② it is input to A/D conversion (8 bit). After finishing A/D conversion, the data is input to the Image Processing Section via route ③. Then via routes ④ and ⑤, it is stored in RAM as shading data.
- 3) The draft's information that is read by CCD is input to IC501 via route ①. After adjusting it to a suitable level for A/D conversion via route ②, the draft's information is converted to A/D (8 bit), and it is input to the Image Processing Section. The other side, the shading data which flows from RAM via routes ⑥ and ⑦, is input to the Image Processing Section. After finishing the draft's information image processing, white is regarded as "0" and black is regarded as "1". Via routes ④ and ⑤, they are stored in RAM.
- 4) The white/black data stored as above via routes ⑥ and ⑧, is input to the P/S converter. The white/black data converted to serial data in the P/S converter is input to the Thermal Head via route ⑨ and is printed out on recording paper.

Note:

Standard :	Reads 3.58 times/mm
Fine :	Reads 7.7 times/mm
Super-Fine :	Reads 15.4 times/mm

Transmission

- 1) Same processing as **COPY** items 1) - 3).
- 2) The data stored in the RAM of IC501 is output from IC501 via routes ⑥ and ⑩, and is stored in the system bus. Via route ⑪, it is stored in the communication buffer inside DRAM (IC503).
- 3) While retrieving data stored in the communication buffer synchronous with the modem, the CPU (inside IC501) inputs the data to the modem along route ⑫, where it is converted to serial analog data and forwarded over the telephone lines via the NCU Section.

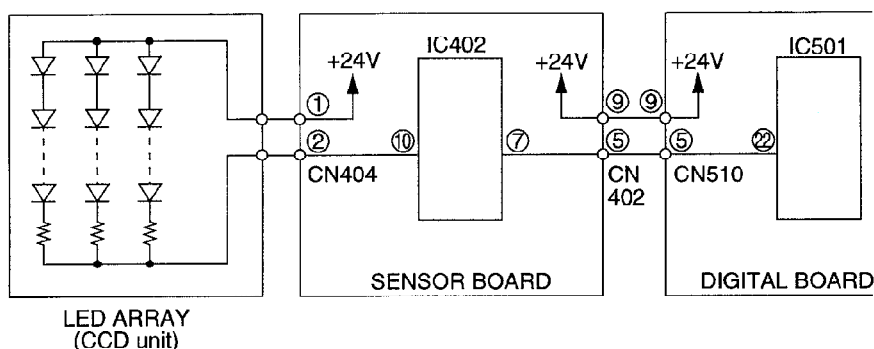
Reception

- 1) The serial analog Image data is received over the telephone lines and input to the modem via the NCU section, where it is demodulated to parallel digital data. Then the CPU (IC501) stores the data in the communication buffer DRAM (IC503) along route ⑫.
- 2) The data stored in DRAM (IC503) is decoded by the CPU (IC501) via route ⑬, and is stored in DRAM (IC503) via routes ⑭ and ⑮.
- 3) Same processing as **COPY** item 4).

3.11 LED ARRAY

The LED ARRAY will light during transmission and copying as a light source to recognize document characters, patterns, or graphics on a document. Pin 22 of IC501 is low level while the LED array is lit. It is also possible to light the LED ARRAY in the test mode (SCAN CHECK: Refer to page 105.).

Circuit Diagram



4. FACSIMILE SECTION

4.1 IMAGE DATA FLOW DURING FACSIMILE OPERATION

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- 3) The draft's information that is read by CCD is input to IC501 via route ①. After adjusting it to a suitable level for A/D conversion via route ②, the draft's information is converted to A/D (8 bit), and it is input to the Image Processing Section. The other side, the shading data which flows from RAM via routes ⑥ and ⑦, is input to the Image Processing Section. After finishing the draft's information image processing, white is regarded as "0" and black is regarded as "1". Via routes ④ and ⑤, they are stored in RAM.
- 4) The white/black data stored as above via routes ⑥ and ⑧, is input to the P/S converter. The white/black data converted to serial data in the P/S converter is input to the Thermal Head via route ⑨ and is printed out on recording paper.

Note:

Standard :	Reads 3.58 times/mm
Fine :	Reads 7.7 times/mm
Super-Fine :	Reads 15.4 times/mm

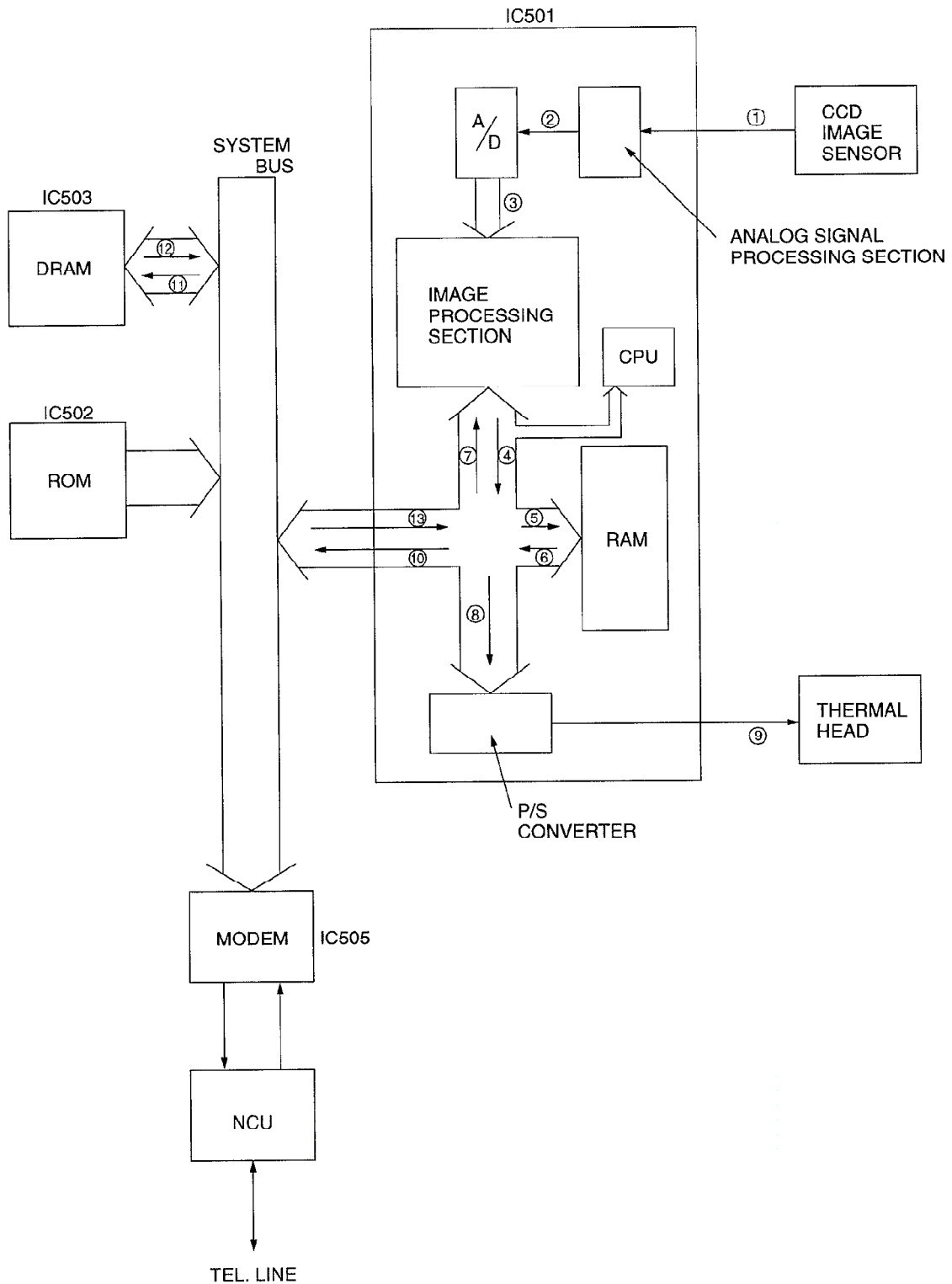
Transmission

- 1) Same processing as **COPY** items 1) - 3).
- 2) The data stored in the RAM of IC501 is output from IC501 via routes ⑥ and ⑩, and is stored in the system bus. Via route ⑪, it is stored in the communication buffer inside DRAM (IC503).
- 3) While retrieving data stored in the communication buffer synchronous with the modem, the CPU (inside IC501) inputs the data to the modem along route ⑫, where it is converted to serial analog data and forwarded over the telephone lines via the NCU Section.

Reception

- 1) The serial analog Image data is received over the telephone lines and input to the modem via the NCU section, where it is demodulated to parallel digital data. Then the CPU (IC501) stores the data in the communication buffer DRAM (IC503) along route ⑫.
- 2) The data stored in DRAM (IC503) is decoded by the CPU (IC501) via route ⑬, and is stored in DRAM (IC503) via routes ⑭ and ⑮.
- 3) Same processing as **COPY** item 4).

Block Diagram



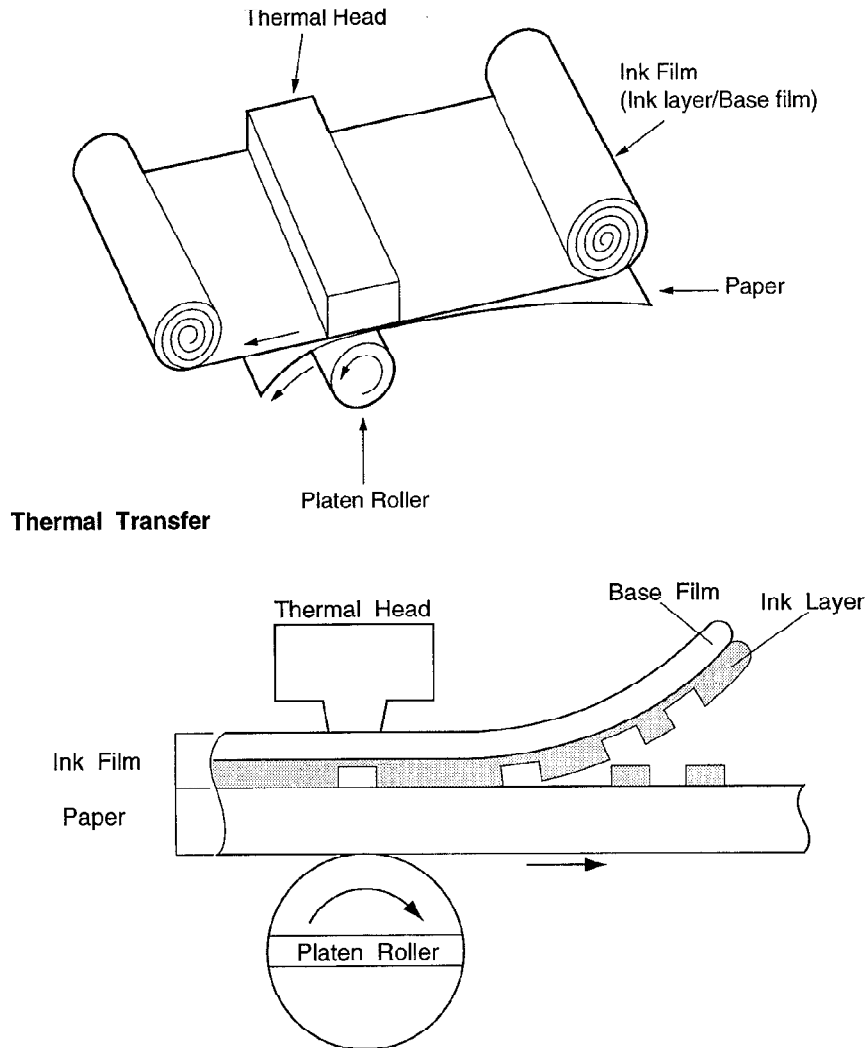
4.2 THERMAL HEAD

1) Function

This unit utilizes state of the art thermal printer technology.

The ink film is chemically processed. The ink film is comprised of two parts: an ink layer and a base film. When the thermal head contacts this ink film, it emits heat momentarily, and the ink layer is melted and transferred to the paper. If this continues, letters and/or diagrams appear, and the original document is reproduced.

COMPOSITION OF THE RECEIVE RECORD SECTION (THERMAL RECORDING FORMAT)



2) Circuit Operation

Refer to the block diagram and the timing chart on the following page.

There are 27 driver ICs aligned horizontally on the thermal head and each one of these ICs can drive 64 heat emitting registers. This means that one line is at a density of $64 \times 27 = 1728$ dots \approx (8 dots/mm).

White/Black (white=0, black=1) data in one line increments is synchronized at IC501 pin 146 (THCLK), and sent from IC501 pin 145 (THDAT) to the shift register of the ICs. The shift registers of the 27 ICs are connected in series, and upon the shift of the 1728 dot increment, the shift register becomes filled with data, and a latch pulse is emitted to each IC from IC501 pin 147 (THLAT). With this latch pulse, all the contents of the shift registers are latched to the latch registers. Thereafter, through the addition of strobes from the IC501 pins (138, 139, 140), only the dot location of black (=1) among latched data activates the driver, and the current passes to heat the emitting body to cause heat emission.

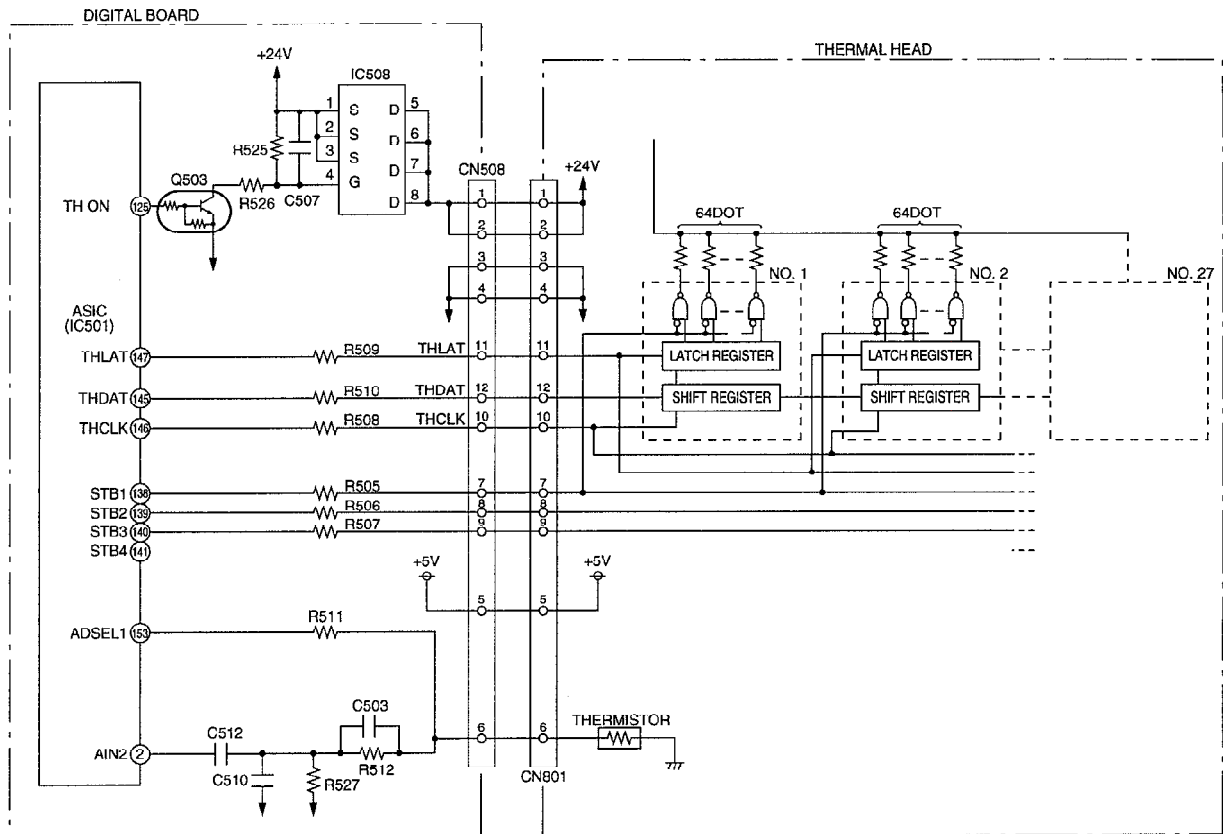
Here, the three line strobes, STB1 to STB3, impress at intervals of 9.216 msec, as required for one-line printout.

The sequence is shown on the next page. [Moreover, for the strobe width, the thermistor value inside the thermal head is detected according to IC501 pin 2. Depending on that value, the strobe width is recorded in ROM (IC502).

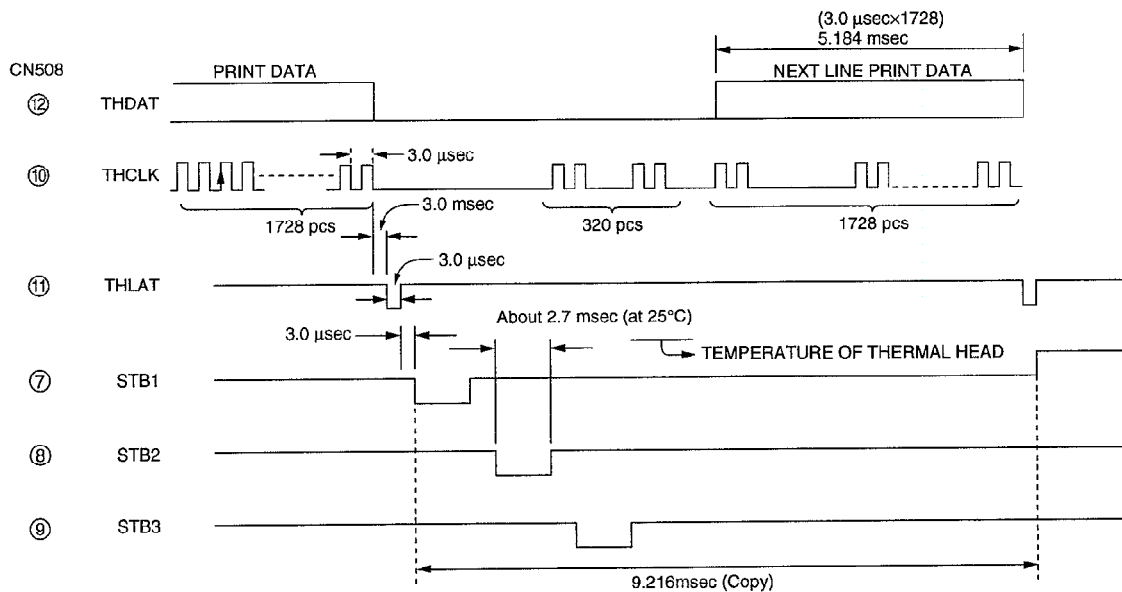
Accordingly, the strobe width is determined.]

When the thermal head is not used, the IC501 (125, THON) becomes low, Q503 turns OFF, IC508 turns OFF, and the +24V power supply for the thermal head driver is not impressed to protect the IC.

Circuit Diagram



Timing Chart



4.3 READ SECTION

1) Function

- A document is illuminated by the LED array, and the reflections pass through the reduction-projection lens and are imaged on the CCD image sensor.
- The document image is photoelectrically transferred by the CCD image sensor, and an analog image signal corresponding to one line of the document is output continuously.
- The analog image signal enters the image signal processing circuit in ASIC (IC501) and then is converted into digital data.

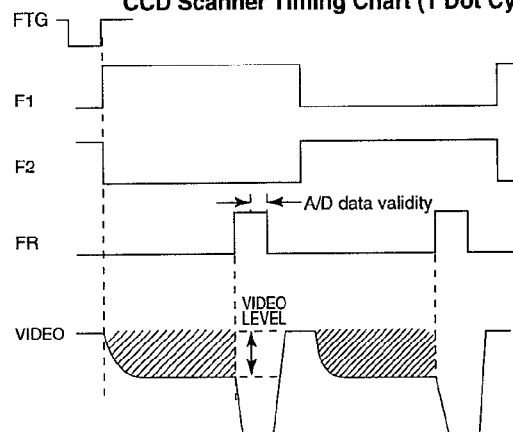
2) Circuit Operation

[Start]

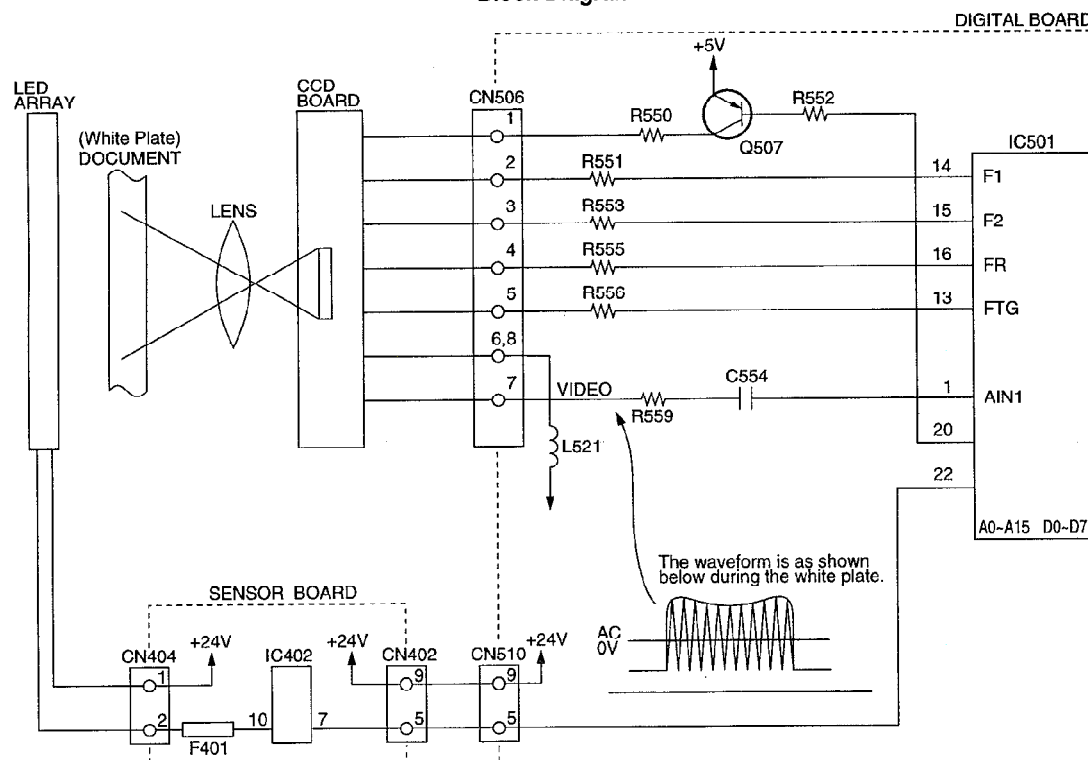
When the START/COPY button is pressed, pin 48 of IC501 goes to a low level and Q507 is turned ON. This makes pin 22 of IC501 a high level and the voltage applied to the LED array turns on the LED.

F1, F2, FR and FTG signals are output to the CCD board to drive the CCD image sensor. Therefore, when the LED is turned ON, the VIDEO (analog image signal) is output from the CCD board to pin 7 of CN506.

CCD Scanner Timing Chart (1 Dot Cycle)



Block Diagram



CIRCUIT OPERATIONS

4.4 STEPPING MOTOR DRIVE CIRCUIT

1) Function

Two individual stepping motors are used for transmission and reception. They feed the document or recording paper synchronized for reading or printing.

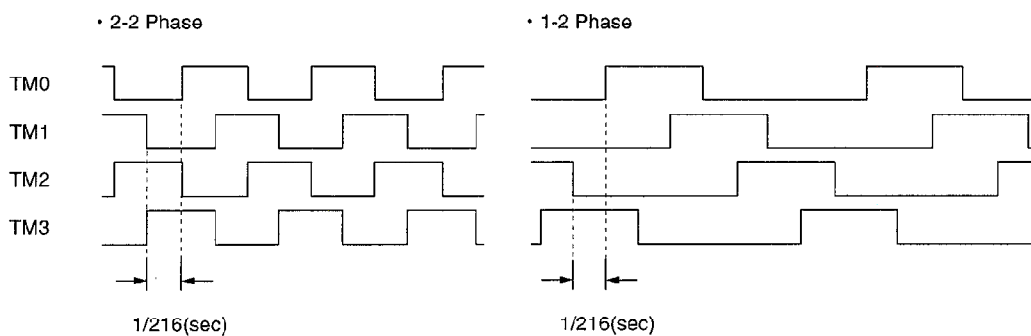
2) TX Motor

During motor driving, pin 137 of ASIC IC501 becomes a high level, driver pin 12 of IC402 becomes a low level, and Q402 turns ON. As a result, +24V is supplied to the motor coil.

Stepping pulses are output from gate array IC501 pins, 131,134~136, causing driver IC402 pins, 16~13 to drive the TX Motor Coil. The motor coil is energized sequentially in 2 phase increments, which causes a 1-step rotation. A 1-step rotation feeds 0.13 mm of recording paper or document paper.

The timing chart is below.

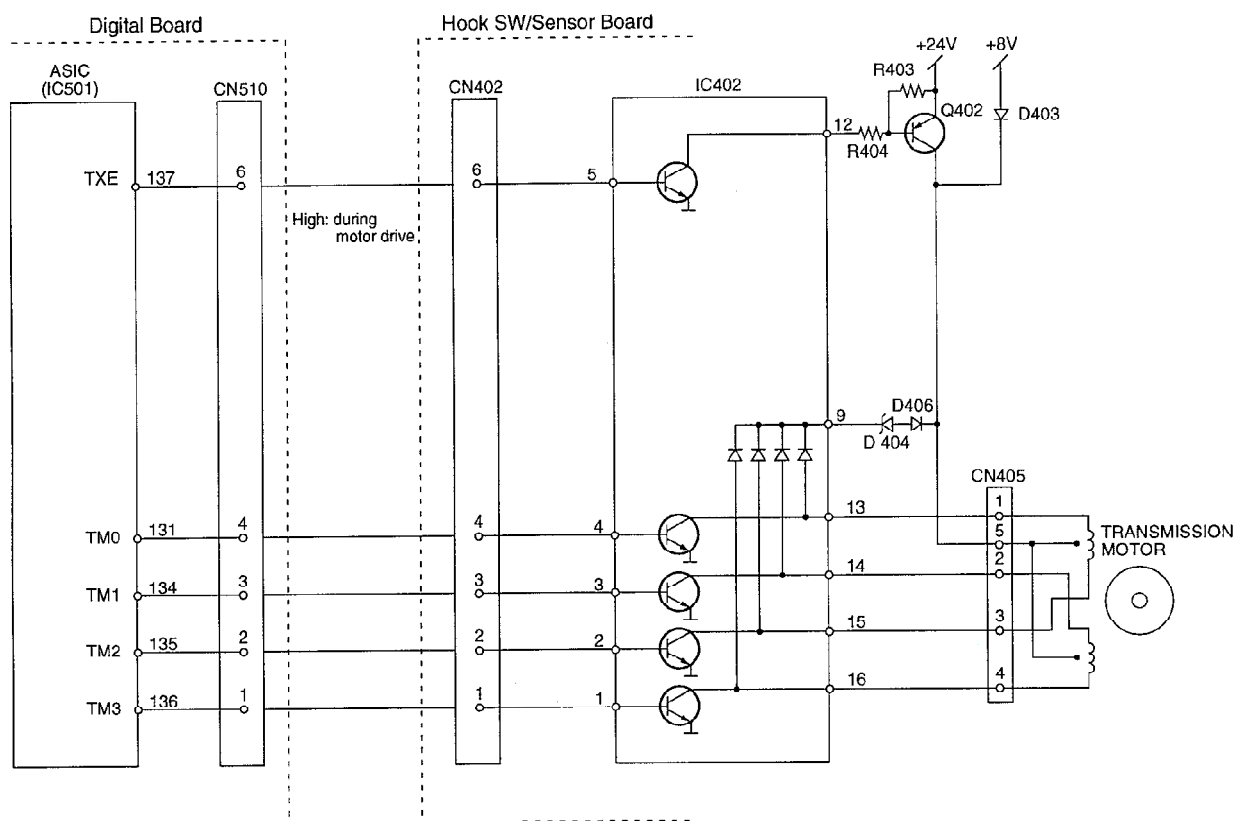
Stepping Motor Timing Chart



Stepping Motor Drive Mode

Function	Mode	Phase Pattern	Speed
Copy	Fine	1-2	216 pps
FAX	Standard	2-2	216 pps
	Fine or Half tone	1-2	216 pps
Paper Feed	—	2-2	216 pps
Stand-by	—	All phases are currently off.	None

Circuit Diagram



When the motor is stopped for a period (about 70~80 msec) during the receive mode, pin 137 of ASIC IC501 becomes a low level and driver IC402 pin 13 becomes a high level. This causes Q402 to also turn OFF, and instead of +24 V, +8 V is supplied through D403 so that the motor is held in place. When the system is in the stand-by mode, all of the motor drive transistors are OFF. Therefore the motor current is OFF.

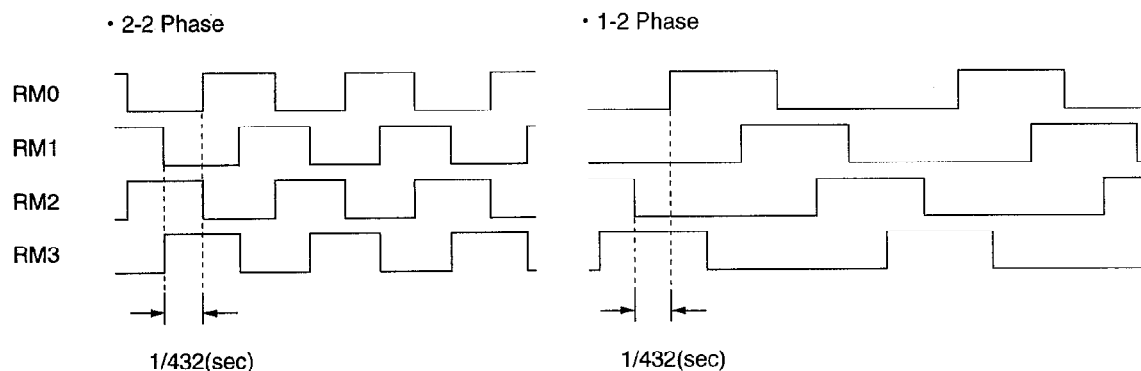
3) RX Motor

During motor driving, pin 130 of ASIC IC501 becomes a high level, driver IC401 pin 14 becomes a low level, and Q401 turns ON. As a result, +24V is supplied to the motor coil.

Stepping pulses are output from ASIC IC501 pins, 126~129, causing driver IC401 pins, 13~10 to drive the RX Motor Coil. The motor coil is energized sequentially in 2 phase increments, which causes a 1-step rotation. A 1-step rotation feeds 0.13 mm of recording paper or document paper.

The timing chart is below.

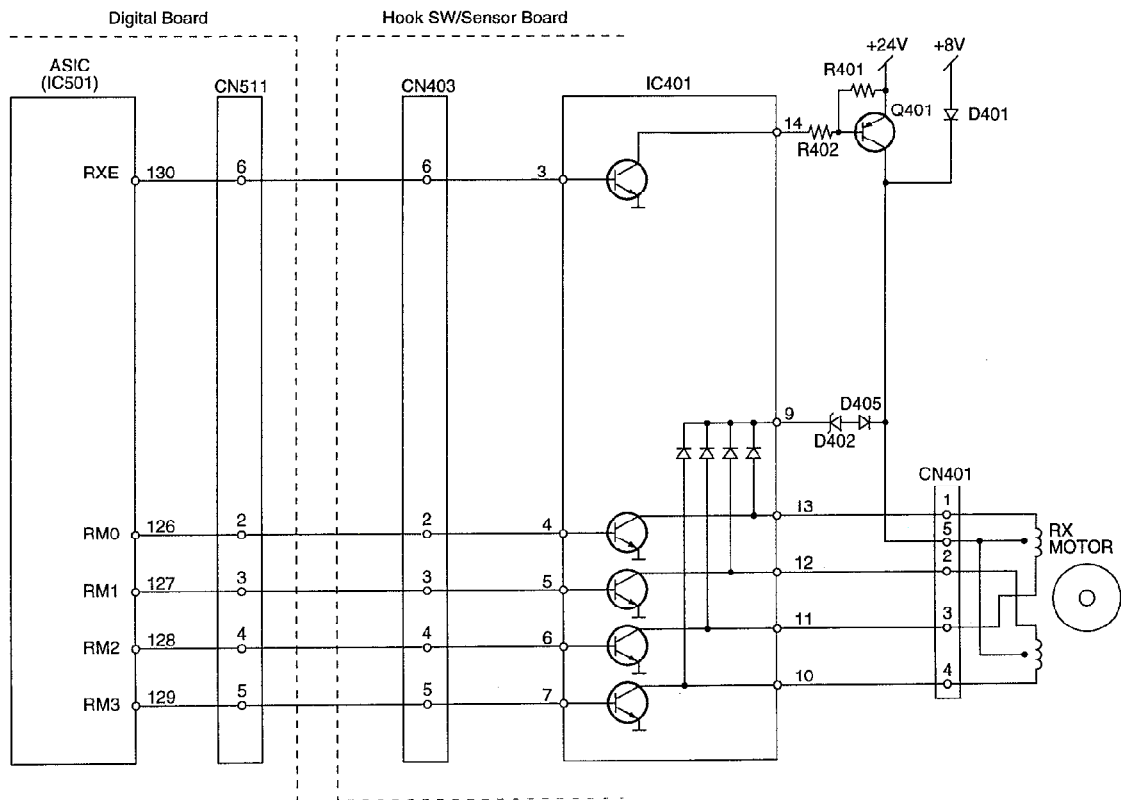
Stepping Motor Timing Chart



Stepping Motor Drive Mode

Function	Mode	Phase Pattern	Speed
Copy	Fine	1-2	432 pps
FAX	Standard	1-2	432 pps
	Fine or Half tone	1-2	432 pps
Paper Feed	—	1-2	432 pps
Stand-by	—	All phases are currently off.	None

Circuit Diagram



When the motor is stopped for a period (about 70~80 msec) during the receive mode, pin 130 of ASIC IC501 becomes a low level and driver IC401 pin 14 becomes a high level. This causes Q401 to also turn OFF, and instead of +24V, +8V is supplied through D401 so that the motor is held in place. When the system is in the stand-by mode, all of the motor drive transistors are OFF. Therefore the motor current is OFF.

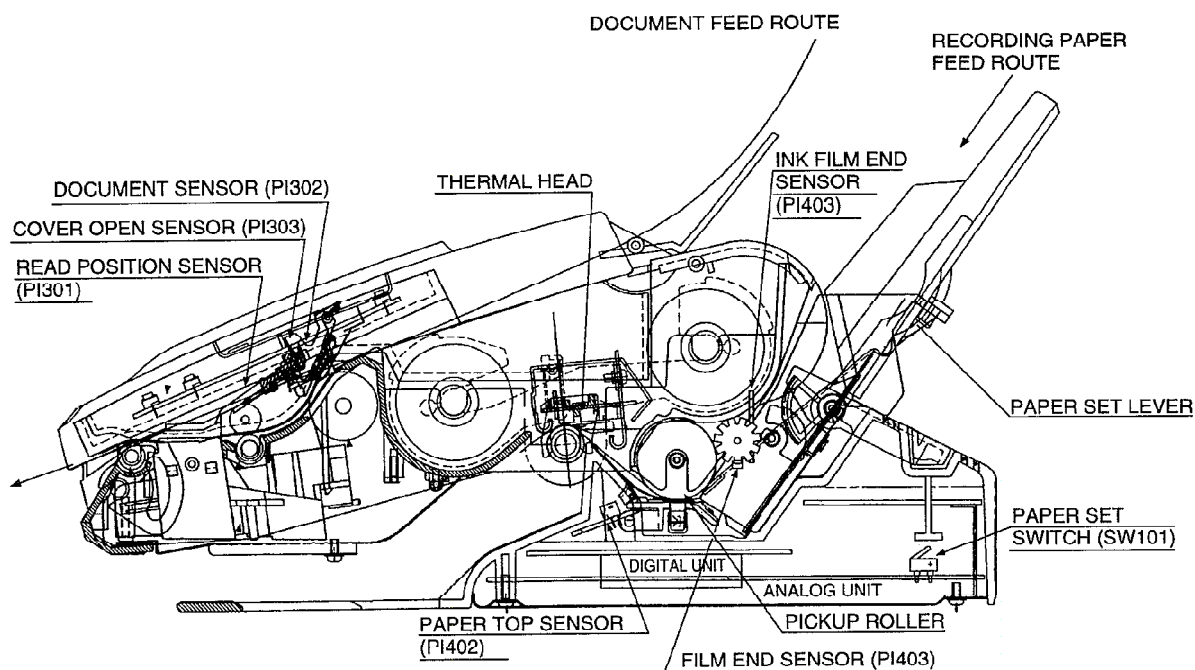
4.5 SENSORS AND SWITCHES

All of the sensor and switches are shown below.

Sensor Circuit Location	Sensor	Sensor or Switch Name	Message Error
Operation Panel	PI301	Document Read Position	[REMOVE DOCUMENT]
	PI302	Document	[CHECK DOCUMENT]
	PI303	Cover Open	[CHECK COVER]
Digital PCB & Analog PCB & Sensor PCB	SW401	Hook	_____
	SW101	Paper Set	[CHECK LEVER]
	PI402	Paper Top	[PAPER JAMMED]
	PI403	Film End	[FILM EMPTY]

※ See the TEST FUNCTION - SENSOR CHECK SECTION for the sensor test.
(#815 of Service Mode test. Refer to page 106.)

Sensor Locations



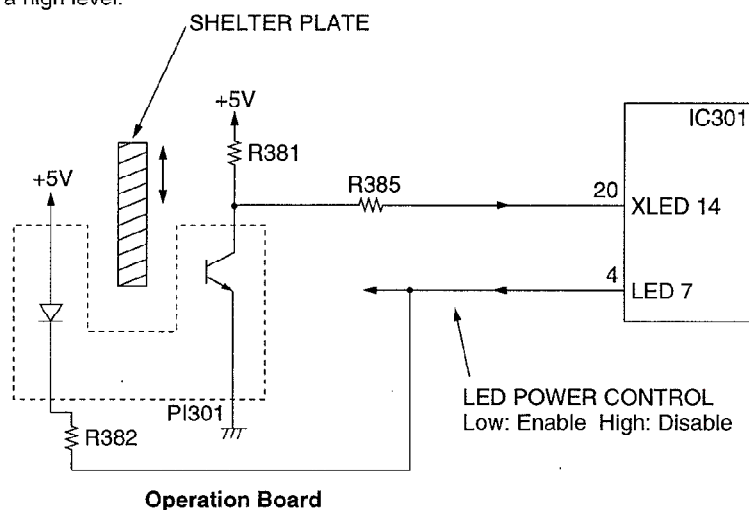
CIRCUIT OPERATIONS

KX-FP270

①[Read Position Sensor (PI301)]

The sensor detects the front edge of the document.

When a document is brought to the read position, the shelter plate passes over the sensor light, the phototransistor turns ON, and the input signal of IC301-20 pin (Operation) becomes a low level. When there is no document at the read position, the shelter plate closes the sensor light, the phototransistor turns OFF, and the input signal of IC301-20 pin (Operation) becomes a high level.

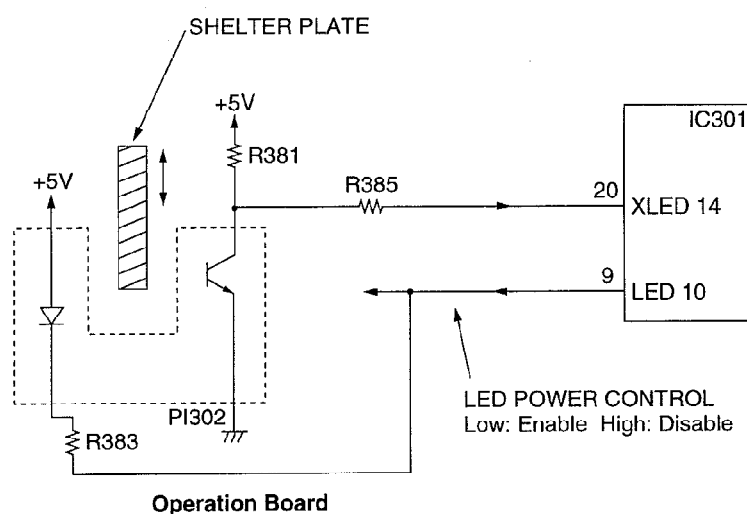


	Phototransistor	Signal (IC301-20 pin)
Non Read Position	OFF	High level
Read Position	ON	Low level

②[Document Sensor (PI302)]

The sensor detects whether or not a document is in place.

When a document is detected, the shelter plate closes the sensor light, the phototransistor turns OFF, and the input signal of IC301-20 pin (Operation) becomes a high level. When there is no document, the shelter plate passes over the sensor light, the phototransistor turns ON, and the input signal of IC301-20 pin (Operation) becomes a low level.

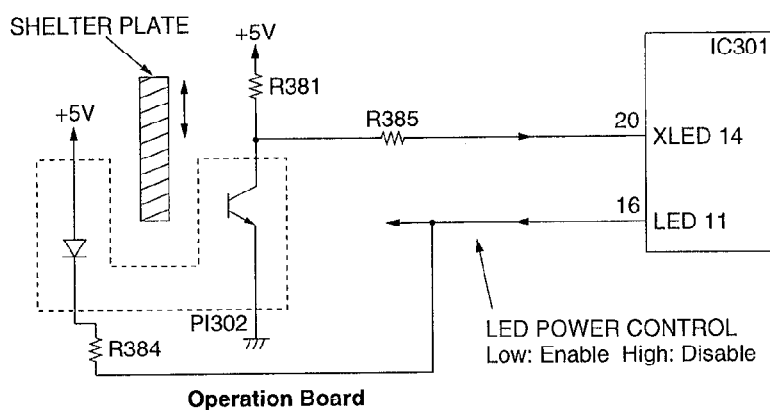


	Phototransistor	Signal (IC301-20 pin)
No Document	ON	Low level
Document Set	OFF	High level

③[Cover Open Sensor (PI303)]

The sensor detects whether the front cover is open or closed.

When the operation panel cover is closed, the shelter plate passes over the sensor light, the phototransistor turns ON, and the input signal of IC301-20 pin (Operation) becomes a low level. When the cover is opened, the shelter plate closes the sensor light, the phototransistor turns OFF, and the input signal of IC301-20 pin (Operation) becomes a high level.

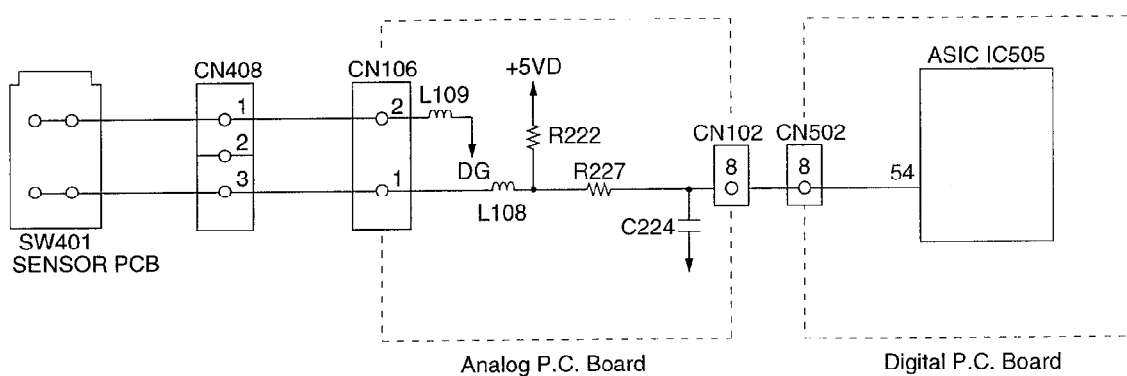


	Phototransistor	Signal (IC301-20 pin)
Open	ON	Low level
Closed	OFF	High level

④[Hook Switch (SW401)]

When the handset is raised, the switch is turned ON, and the signal at pin 54 of IC505 is low.

When the handset is returned, the switch is turned OFF, and the signal at pin 54 of IC505 is high.



	SW	Signal (IC505-54 pin)
ON-Hook	Release	Low level
OFF-Hook	Push	High level

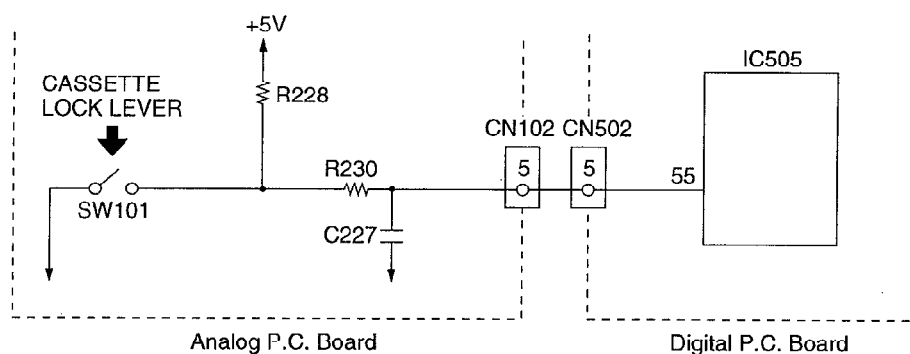
KX-FP270

⑤[Paper Set Switch (SW101)]

The sensor detects whether or not the cassette lock lever is in place.

When the recording paper is installed and the CASSETTE LOCK LEVER is pulled toward you, the plate is separated from the switch lever, causing the signal at pin 55 of IC505 to be high.

When the recording paper is installed and the CASSETTE LOCK LEVER is pushed back, the plate presses down on the switch lever, causing the signal at pin 55 of IC505 to be low.

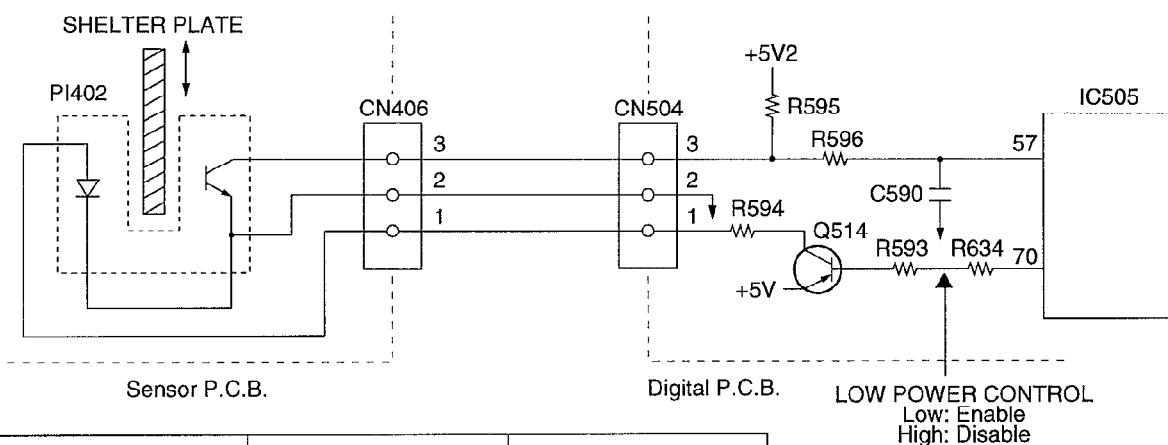


	SW101	Signal (IC505-55 pin)
Set the cassette lock lever	ON	Low level
Release the cassette lock lever	OFF	High level

⑥[Paper top Sensor (PI402)]

The sensor detects whether or not recording paper is present so that printing can start.

When the recording paper is loaded on the print head, the shelter plate shuts the sensor light, and the phototransistor turns OFF. The input signal of IC505-57 pin becomes a high level. Usually, the shelter plate passes over the sensor light, the phototransistor turns ON, and the input signal of IC505-57 pin becomes a low level.



	Phototransistor	Signal (IC505-57 pin)
Recording Paper Set	OFF	High level
No Recording Paper	ON	Low level

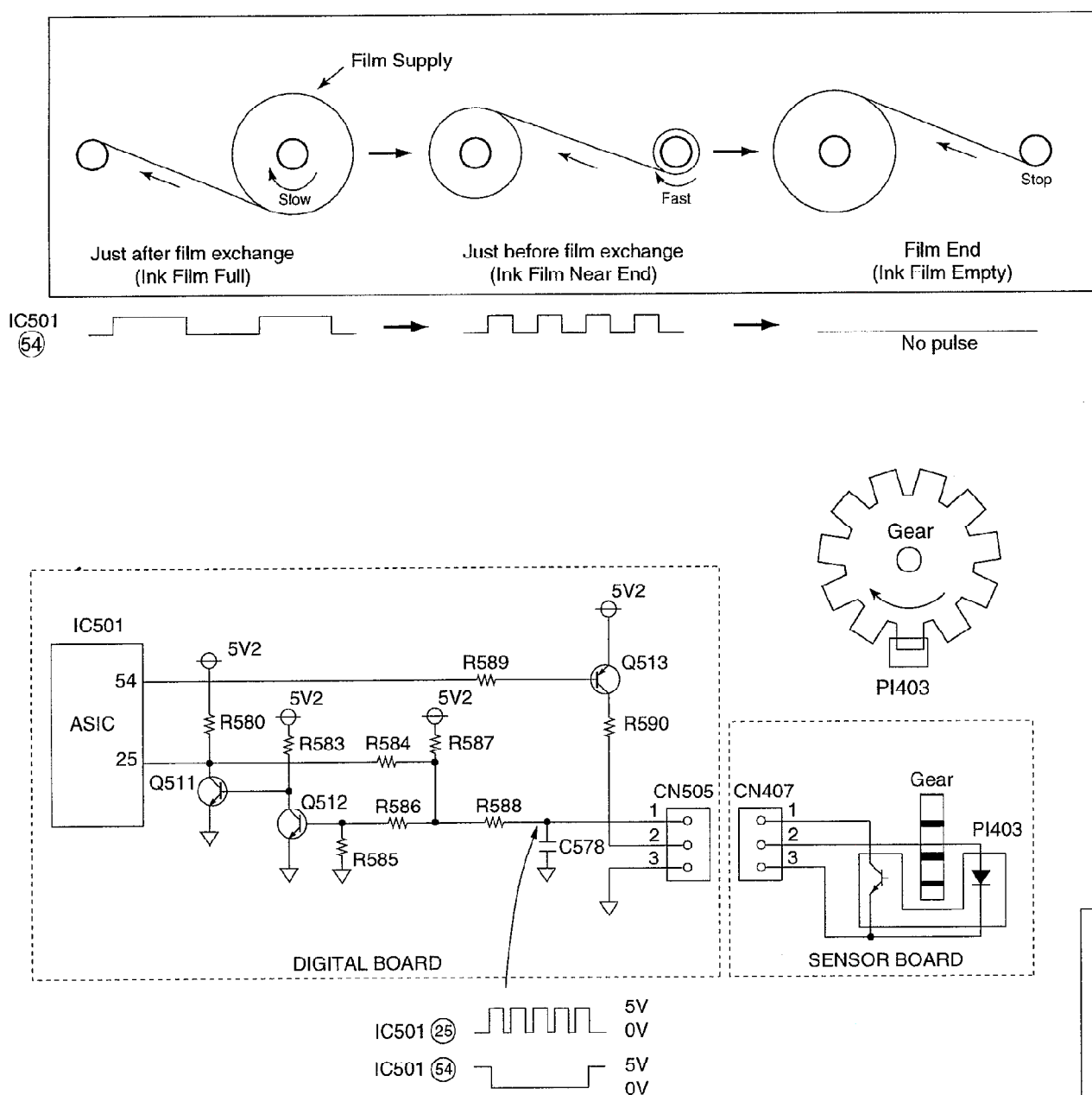
The Interrupt Sensor PI402 LED current is controlled by the IC505-70 pin.

⑦[Film End Sensor (PI403)]

The sensor detects when the ink film has been used up.
As film is used, the revolving speed of the rolled film becomes faster.
In addition, when the film is used up, it comes off of the paper roll.

The remaining film is checked by the revolving speed.
After the film stops turning, the film end is checked.

The rotary encoder rotates slowly when the ink film is full (when printing), as shown in the diagram below. It rotates faster when it is near its end. Sensor PI403 converts the rotation of the rotary encoder into pulses and the amount of ink film remaining is then calculated internally by the ASIC (IC501) and stored into memory. Then this causes an error such as "Film empty" or "Film near empty" to appear on the LCD display.



5. MODEM SECTION

5.1 FUNCTION

The unit uses a 1 chip modem (IC505), enabling it to act as an interface between the control section for FAX sending and receiving, and the telephone line. During a sending operation, the digital image signals are modulated and sent to the telephone line. During a receiving operation, the analog image signals which are received via the telephone line are demodulated and converted into digital image signals. The communication format and procedures for FAX communication are standardized by CCITT. This 1 chip modem (IC505) has hardware which sends and detects all of the necessary signals for FAX communication. It can be controlled by writing commands from the CPU (IC501: inside ASIC) to the register in the modem (IC505). This modem (IC505) also sends DTMF signals, generates a call tone (from the speaker), and detects a busy tone and dial tones.

Overview of Facsimile Communication Procedures (CCITT Recommendation):

1) ON CCITT (International Telegraph and Telephone Consultative Committee)

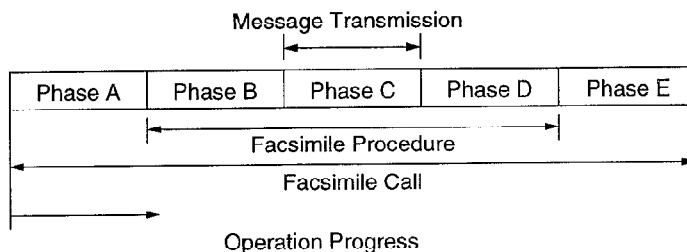
The No. XIV Group of CCITT, one of the four permanent organizations of the International Telecommunications Union (ITU), investigates and make recommendations on international standards for facsimiles.

2) Definition of Each Group

- Group I (G1)
Official A-4 size documents without using formats which reduce the band width of a signal are sent over telephone lines.
Determined in 1968.
Transmission for about 6 minutes at a scanning line density of 3.85 lines/mm.
- Group II (G2)
Using reduction technology in the modulation/demodulation format, an A-4 size document is sent at an official scanning line density of 3.85 lines/mm for about 3 minutes.
Methods to suppress redundancy are not used.
Determined in 1976.
- Group III (G3)
Method of suppressing redundancy in the image signal prior to modulation is used. An A-4 size document is sent within about one minute.
Determined in 1980.
- Group IV (G4)
Transmission is via the data network. A method is provided for suppressing redundancy in signals prior to transmission, and error-free reception of transmission is possible.
The scope of these facsimile applications is not limited simply to transmission of written statements. Through symbiotic linkages with other communication methods, it can be expected to expand to include integrated services.

3) Facsimile Call Time Series

As shown in the following diagram, the facsimile call time series is divided into five phases.



Phase A: Call setting

Call setting can be manual/automatic.

Phase B: Pre-message procedure

Phase B is a pre-processing procedure and sequence for the confirming the status of the terminal, transmission route, etc., and for terminal control. It executes terminal preparation status, determines and displays terminal constants, confirms synchronization status, prepares for transmission of facsimile messages, etc.

Phase C: Message transmission

Phase C is the procedure for the transmission of facsimile messages.

Phase D: Post message procedure

Phase D is the procedure for confirming that the message is completed and received. In the case of continuous transmission, phase B or phase C are repeated for transmission.

Phase E: Call retrieval

Phase E is the procedure for call retrieval, that is for circuit disconnection.

4) Concerning Transmission Time

$$\text{Transmission Time} = \text{Control Time} + \text{Image Transmission Time} + \text{Hold Time}$$

Transmission time consists of the following.

Control time: This is time at the start of transmission when the functions at the sending and receiving sides are confirmed, the transmission mode is established, and transmission and reception are synchronized.

Image transmission time:

This is the time required for the transmission of document contents (image data). In general, this time is recorded in the catalog, etc.

Hold time: This is the time required after the document contents have been sent to confirm that the document was actually sent, and to check for telephone reservations and/or the existence of continuous transmission.

5) Facsimile Standards

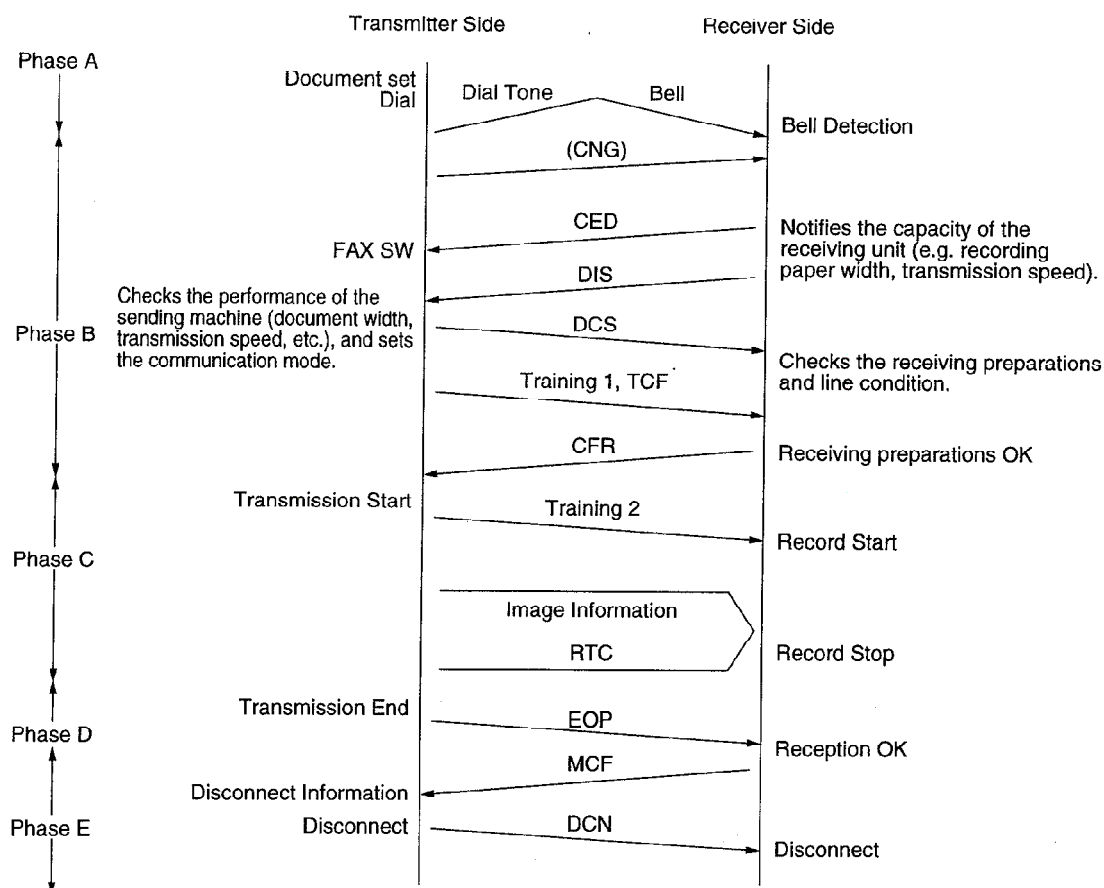
Item	Telephone Network Facsimile
	G3 Machine
Connection Control Mode	Telephone Network Signal Mode
Terminal Control Mode	T. 30 Binary
Facsimile Signal Format	Digital
Modulation Mode	PSK (V. 27 ter) or QAM (V. 29)
Transmission Speed	300 bps (Control Signal) 2400, 4800, 7200, 9600, 12000, 14400 bps (FAX Signal)
Redundancy Compression Process (Coding Mode)	1 dimension : MH Mode 2 dimension : MR Mode (K=2.4)
Resolution	Main Scan : 8 pel/mm Sub Scan : 3.85, 7.71/mm
Line Synchronization Signal	EOL Signal
1 Line Transmission Time [ms/line]	Depends on the degree of data reduction. Minimum Value : 10, 20 Can be recognized in 40ms.

KX-FP270

6) Explanation of Technology

(1) G3 Communication Signals (T. 30 Binary Process)

For G3 Facsimile communication, this is the procedure for exchanging control signals between the sending and receiving machines both before and after transmission of image signals.



Control signals at 300 bps FSK are: 1850 Hz...0, 1650Hz...1.

An example of a binary process in G3 communication is shown below.

Explanation of Signals

Control signals are comprised mainly of 8-bit identification signals and the data signals added to them. Data signals are added to DIS and DCS signals.

Signal.....DIS (Digital Identification Signal)

Identification Signal Format.....00000001

Function:

Notifies the capacity of the receiving unit.

The added data signals are as follows.

(Example)

Signal.....DCS (Digital Command Signal)

Identification Signal Format.....X1000001

(Example)

Note: Some models do not support the following items.

Bit No.	DIS/DTC	DCS
1	Transmitter --- T.2 operation	
2	Receiver --- T.2 operation	Receiver --- T.2 operation
3	T.2 IOC = 176	T.2 IOC = 176
4	Transmitter --- T.3 operation	
5	Receiver --- T.3 operation	Receiver --- T.3 operation
6	Reserved for future T.3 operation features	

Bit No.	DIS/DTC	DCS
7	Reserved for future T.3 operation features.	
8	Reserved for future T.3 operation features.	
9	Transmitter --- T.4 operation	
10	Receiver --- T.4 operation	Receiver --- T.4 operation
11, 12, 13, 14	Data signaling rate 0, 0, 0, 0 V.27 <i>ter</i> fall back mode 0, 1, 0, 0 V.27 <i>ter</i> 1, 0, 0, 0 V.29 1, 1, 0, 0 V.27 <i>ter</i> and V.29 0, 0, 1, 0 Not used 0, 1, 1, 0 Reserved 1, 0, 1, 0 Not used 1, 1, 1, 0 V.27 <i>ter</i> and V.29 and V.33 0, 0, 0, 1 Not used 0, 1, 0, 1 Reserved 1, 0, 0, 1 Not used 1, 1, 0, 1 V.27 <i>ter</i> and V.29 and V.33 and V.17 0, 0, 1, 1 Not used 0, 1, 1, 1 Reserved 1, 0, 1, 1 Not used 1, 1, 1, 1 Reserved	Data signaling rate 2400 bit/s, V.27 <i>ter</i> 4800 bit/s, V.27 <i>ter</i> 9600 bit/s, V.29 7200 bit/s, V.29 14400 bit/s, V.33 12000 bit/s, V.33 Reserved Reserved 14400 bit/s, V.17 12000 bit/s, V.17 9600 bit/s, V.17 7200 bit/s, V.17 Reserved Reserved Reserved Reserved
15	R8×7.7 lines/mm and/or 200×200 pels/25.4mm	R8×7.7 lines/mm and/or 200×200 pels/25.4mm
16	Two-dimensional coding capability	Two-dimensional coding capability
17, 18	Recording width capabilities	Recording width
(0, 0)	1728 picture elements along scan line length of 215 mm ± 1%	1728 picture elements along scan line length of 215 mm ± 1%
(0, 1)	1728 picture elements along scan line length of 215 mm ± 1%	2432 picture elements along scan line length of 303 mm ± 1%
	2048 picture elements along scan line length of 255 mm ± 1%	
	2432 picture elements along scan line length of 303 mm ± 1%	
(1, 0)	1728 picture elements along scan line length of 215 mm ± 1%	2048 picture elements along scan line length of 255 mm ± 1%
	2048 picture elements along scan line length of 255 mm ± 1%	
(1, 1)	Invalid	Invalid
19, 20	Maximum recording length capability	Maximum recording length
(0, 0)	A4 (297 mm)	A4 (297 mm)
(0, 1)	Unlimited	Unlimited
(1, 0)	A4 (297 mm) and B4 (364 mm)	B4 (364 mm)
(1, 1)	Invalid	Invalid
21, 22, 23	Minimum scan line time capability of the receiver	Minimum scan line time
(0, 0, 0)	20 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	20 ms
(0, 0, 1)	40 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	40 ms
(0, 1, 0)	10 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	10 ms
(1, 0, 0)	5 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	5 ms
(0, 1, 1)	10 ms at 3.85 l/mm: $T_{7.7} = 1/2 T_{3.85}$	
(1, 1, 0)	20 ms at 3.85 l/mm: $T_{7.7} = 1/2 T_{3.85}$	
(1, 0, 1)	40 ms at 3.85 l/mm: $T_{7.7} = 1/2 T_{3.85}$	
(1, 1, 1)	0 ms at 3.85 l/mm: $T_{7.7} = T_{3.85}$	0 ms
24	Extend field	Extend field
25	2400 bit/s handshaking	2400 bit/s handshaking

KX-FP270

Bit No.	DIS/DTC	DCS
26	Uncompressed mode	Uncompressed mode
27	Error correction mode	Error correction mode
28	Set to "0".	Frame size 0 = 256 octets 1 = 64 octets
29	Error limiting mode	Error limiting mode
30	Reserved for G4 capability on PSTN	Reserved for G4 capability on PSTN
31	T.6 coding capability	T.6 coding enabled
32	Extend field	Extend field
33 (0) (1)	Validity of bits 17, 18 Bits 17, 18 are valid Bits 17, 18 are invalid	Recording width Recording width indicated by bits 17, 18 Recording width indicated by this field bit information
34	Recording width capability 1216 picture elements along scan line length of $151 \pm 1\%$	Middle 1216 elements of 1728 picture elements
35	Recording width capability 864 picture elements along scan line length of $107 \pm 1\%$	Middle 864 elements of 1728 picture elements
36	Recording width capability 1728 picture elements along scan line length of $151 \pm 1\%$	Invalid
37	Recording width capability 1728 picture elements along scan line length of $107 \pm 1\%$	Invalid
38	Reserved for future recording width capability.	
39	Reserved for future recording width capability.	
40	Extend field	Extend field
41	R8×15.4 lines/mm	R8×15.4 lines/mm
42	300×300 pels/25.4 mm	300×300 pels/25.4 mm
43	R16×15.4 lines/mm and/or 400×400 pels/25.4 mm	R16×15.4 lines/mm and/or 400×400 pels/25.4 mm
44	Inch based resolution preferred	Resolution type selection "0" : metric based resolution "1" : inch based resolution
45	Metric based resolution preferred	Don't care
46	Minimum scan line time capability for higher resolutions "0" : $T_{15.4} = T_{7.7}$ "1" : $T_{15.4} = 1/2T_{7.7}$	Don't care
47	Selective Polling capability	Set to "0".
48	Extend field	Extend field

Note 1 - Standard facsimile units conforming to T.2 must have the following capability : Index of cooperation (IOC)=264.

Note 2 - Standard facsimile units conforming to T.3 must have the following capability : Index of cooperation (IOC)=264.

Note 1 - Standard facsimile units conforming to T.4 must have the following capability : Paper length=297 mm.

Signal	Identification Signal Format	Function
Training 1	_____	A fixed pattern is transmitted to the receiving side at a speed (2400 to 9600 bps) designated by DCS, and the receiving side optimizes the automatic equalizer, etc., according to this signal.

Signal	Identification Signal Format	Function
TCF (Training Check)	_____	Sends 0 continuously for 1.5 seconds at the same speed as the training signal.
CFR (Confirmation to Receive)	X0100001	Notifies the sending side that TCF has been properly received. If TCF is not properly received, FTT (Failure To Train) X0100010 is relayed to the sender. The sender then reduces the transmission speed by one stage and initiates training once again.
Training 2	_____	Used for reconfirming the receiving side like training 1.
Image Signal	Refer to the next page.	_____
RTC (Return to Control)	_____	Sends 12 bits (0...01 X 6 times) to the receiver at the same speed as the image signal and notifies completion of transmission of the first sheet.
EOP (End of Procedure)	X1110100	End of one communication
MCF (Message Confirmation)	X0110001	End of 1 page reception
DCN (Disconnect)	X1011111	Phase E starts.
MPS (Multi-Page Signal)	X1110010	Completion of transmission of 1 page. If there are still more documents to be sent, they are output instead of EOP. After MCF reception, the sender transmits an image signal of the second sheet.
PRI-EOP (Procedural Interrupt-EOP)	X1111100	If there is an operator call from the sender, it is output after RTC.
PIP (Procedural Interrupt Positive)	X0110101	This is output when an operator call is received.

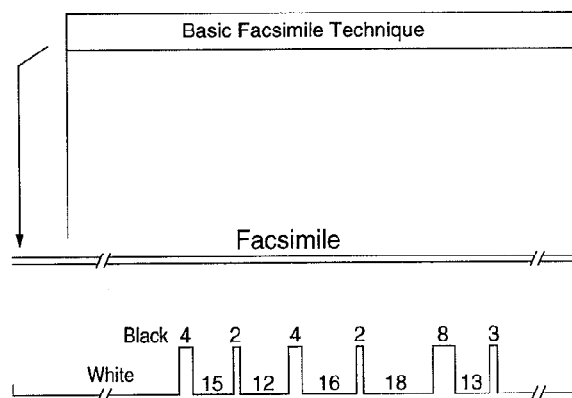
(2) Redundancy Compression Process Coding Mode
This unit uses one-dimensional MH format.

(a) Document

(b) Part of document

(c) Run length and image signals equivalent to (b)

(d) Codification of (c) according to MH formula



00110111101010 011 110101 11 001000 011 101010
(White 400) (Black 4) (White 15) (Black 2) (White 12) (Black 4) (White 16)

11 0100111 000101 000011 10
(Black 2) (White 18) (Black 8) (White 13) (Black 3)

- (c) Total bit number before MH codification (497 bit)
(d) Total bit number after MH codification (63 bit)

Modified Huffman (MH) Code		
Run length	Code for White Line	Code for Black Line
0	00110101	000011011
1	000111	010
2	0111	11
3	1000	10
4	1011	011
5	1100	0011
6	1110	0010
7	1111	00011
8	10011	000101
9	10100	000100
10	00111	0000100
11	01000	0000101
12	001000	0000111
13	000011	00000100
14	110100	00000111
15	110101	000011000
16	101010	0000010111
17	101011	0000011000
18	0100111	0000001000

5.2 MODEM CIRCUIT OPERATION

The modem (IC505) has all the hardware satisfying the ITU-T standards mentioned previously.

When the ASIC IC501 (53) is brought to a low level, the modem (IC505) is chip-selected and the resistors inside IC are selected by the select signals from ASIC (IC501) A0-A4. The commands are written through the data bus, and all the processing is controlled by the ASIC (IC501) according to ITU-T procedures. The INT signal dispatched from IRQ (pin 68 of IC505) to ASIC (IC501) when the transmission data is accepted and the received data is demodulated, the ASIC (IC501) implements post processing. This modem (IC505) has an automatic application equalizer.

With training signal 1 or 2 during G3 reception, it can automatically establish the optimum equalizer. The modem (IC505) operates using the 53.76 MHz clock (X503).

1) Facsimile Transmission

The digital image data on the data bus is modulated in the modem (IC505), and sent from pin 28, 29 via amplifier IC515 and the NCU section to the telephone line.

{IC505 (28, 29) → C605 → R607 → IC515 (6 → 7) → CN501 (8)} → CN101 (8) → C104 → R107 → C103
 → IC101 (4 → 3) → C131 → R146 → IC104 (6 → 7) → C152 → R163 → T101 → TEL LINE.

2) Facsimile Reception

The analog image data which is received from the telephone line passes through the NCU section and enters pin 38 of the modem (IC505). The signals that enter pin 38 of the modem (IC505) are demodulated in the board to digital image signals, then placed on the data bus.

In this case, the image signals from the telephone line are transmitted serially. Hence, they are placed on the bus in 8 bit units. Here, the internal equalizer circuit reduces the image signals to a long-distance receiving level.

This is designed to correct the characteristics of the frequency band centered about 3 kHz and maintain a constant receiving sensitivity. It can be set in the service mode.

TEL LINE → T101 → R144 → C138 → IC104 (2 → 1) → C126 → R114 → C105 → IC101 (1 → 2) → C102
 → CN101 (7) → {CN501 (7) → R617 → IC515 (2 → 1) → C611 → H603 → R629 → IC505 (38)}

{ } : Digital board

3) DTMF Transmission (Monitor tone)

The DTMF signal generated in the modem (IC505) is output from pin 28, 29, and is then sent to the circuit on the same route as used for facsimile transmission.

(Line Send) {IC505 (28, 29) → C605 → R607 → IC515 (6 → 7) → CN501 (8)} → CN101 (8) → C135 → R150
 → IC103 (48 → 31) → C132 → R147 → IC104 (6 → 7) → C152 → R163 → T101 → TEL LINE

(DTMF Monitor Tone)

{IC514 (17, 18) → C601 → R604 → IC516 (6 → 7) → CN501 (10)} → CN101 (10) → C134 → R149 → IC103 (46 → 53)
 → R165 → C153 → IC103 (54 → 56) → C106 → R116 → IC102 (4 → 5, 8) → L110
 L111 → Speaker

4) Call Tone Transmission

This is the call signal which is generated in the ASIC (IC501) and sent to the speaker.

{IC501 (34) → R563 → CN501 (11)} → CN101 (11) → C142 → R156 → IC103 (52 → 53) → R165 → C153
 → IC103 (54 → 56) → C106 → R116 → IC102 (4 → 5, 8) → L110
 L111 → Speaker

5) Busy/Dial Tone Detection

The path is the same as FAX receiving. When it is detected, the carrier detect bit of the resistor in the modem (IC505) becomes 1, and this status is monitored by the ASIC (IC501).

Note:

{ } : Inside the digital board

6. DESCRIPTION OF BLOCK DIAGRAM IN ANALOG SECTION

(1) Function

The analog section is composed of the following circuits.

- ① Interface circuit to connect with telephone line (NCU)
- ② Analog gate array (IC103)
 - (1) To change the circuit configuration for Tx/Rx signals of speaker phone, Tx/Rx signals of handset, and fax signals.
 - (2) Adjust volume of speaker.
 - (3) Control other circuits such as NCU.
 - (4) Read information sent from sensors and NCU.

Following is the detailed description of each circuit.

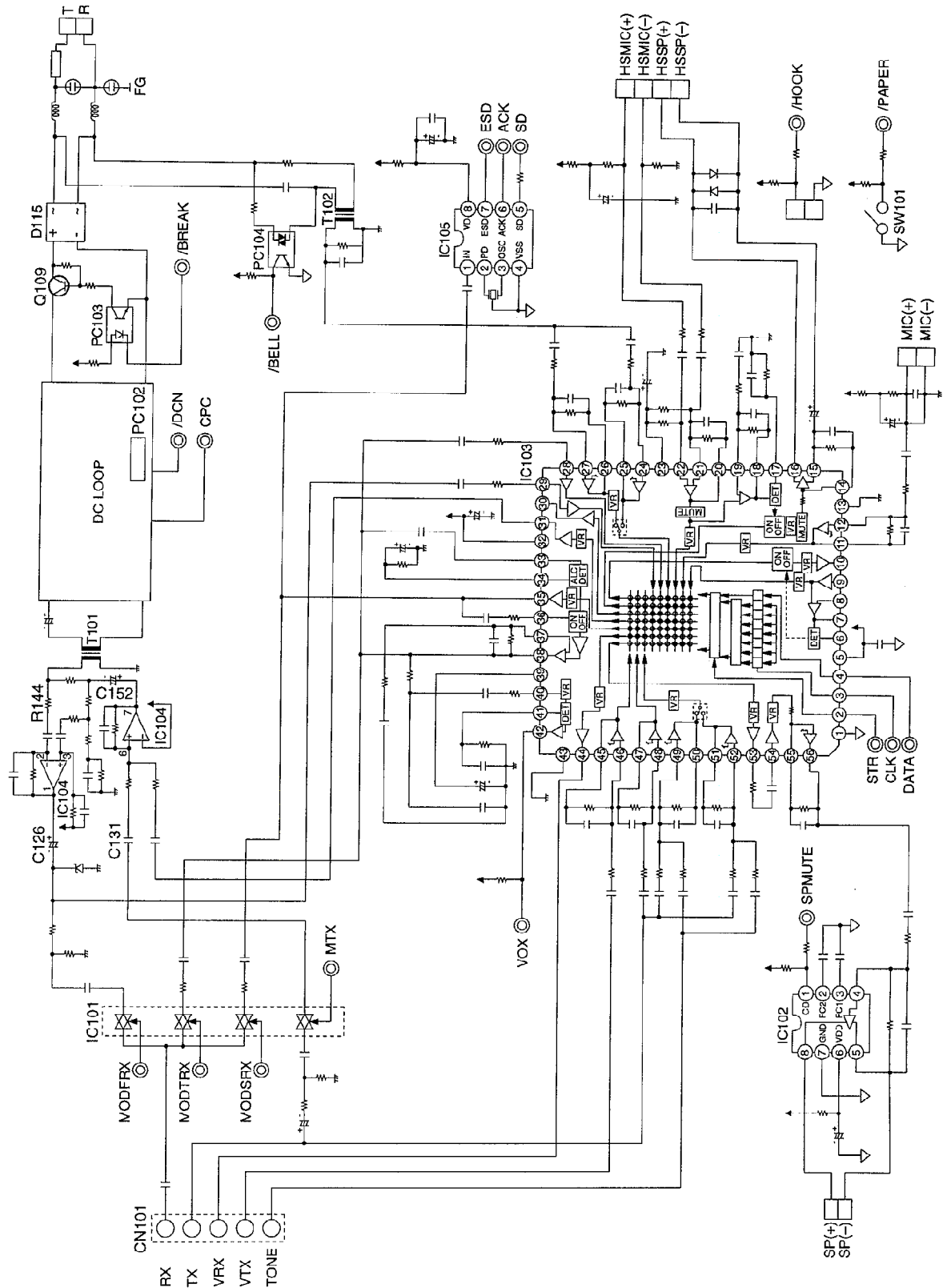
[NCU]:Network Control Unit

The NCU comprises of the following; DC loop forming circuit to connect with the telephone line; Switching circuit for other interconnected telephones; Bell detection circuit; Pulse dial generation circuit; Extension line phone off-hook detection circuit; Sidetone circuit; Remote fax activation circuit. Refer to page 171 for the details.

[Analog gate array (IC103)]

The cross-point switch installed in this IC makes it possible to change the circuit configuration for any analog signals such as the fax signals sent from the digital MODEM board or the Tx/Rx signals for speaker phone. In addition, this analog gate array integrates a handset circuit, signal level adjusting circuit, ALC (Auto level controller) circuit, electronic volume, input/output ports, etc. This IC is controlled by ASIC (IC501) on the digital board.

Analog Unit Block Diagram



7. NCU SECTION

7.1 GENERAL

This section is the interface with the telephone line, and this composed of remote FAX activation circuit, bell detection circuit, pulse dial circuit, CPC detection circuit, line amplifier and sidetone circuit and multiplexer.

7.2 REMOTE FAX ACTIVATION CIRCUIT

1) Circuit Operation

After detecting the bell signal, another telephone connected to same line activate the set to FAX mode by using DTMF signal.

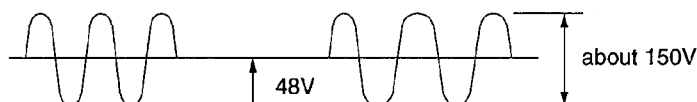
TEL LINE → T102 → C207 → R209 → IC103 (27 → 35) → C204 → IC105 (1)

7.3 BELL DETECTION CIRCUIT

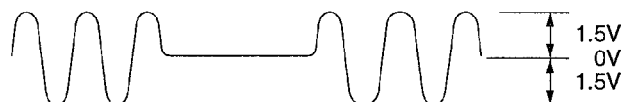
1) Circuit Operation

The signal waveform for each section is indicated below. The signal (low level section) input to pin 51 of ASIC IC501 on the digital board is read.

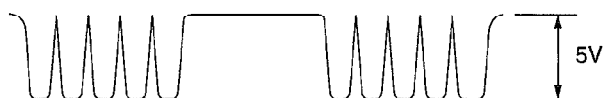
Between the Tip and Ring



Between PC104 (1) and (2)



PC104 (4)/ASIC IC501 (51)



TEL LINE → PC104 (1, 2 → 4) → IC501 (51): Bell

7.4 PULSE DIAL CIRCUIT AND ON/OFF HOOK CIRCUIT

1) Circuit Operation

While OFF-HOOK, Q109 is ON. The photocoupler PC103 pin (2) is a low level by IC501 pin (42) and PC103 (3) and (4) are shorted.

During a pulse dial operation, PC103 pin (2) becomes a high level by IC501 pin (42), so that PC103 pin (3) and (4) are opened. The line turns OFF. ON/OFF, controlled by IC501 pin (42), makes the pulse dial operation possible.

IC501 (42) Break High Level → CN102 (1) → Q109 OFF → PC103 (2) High level → PC103 (3)(4) OFF: DC Loop OFF (ON HOOK Status)

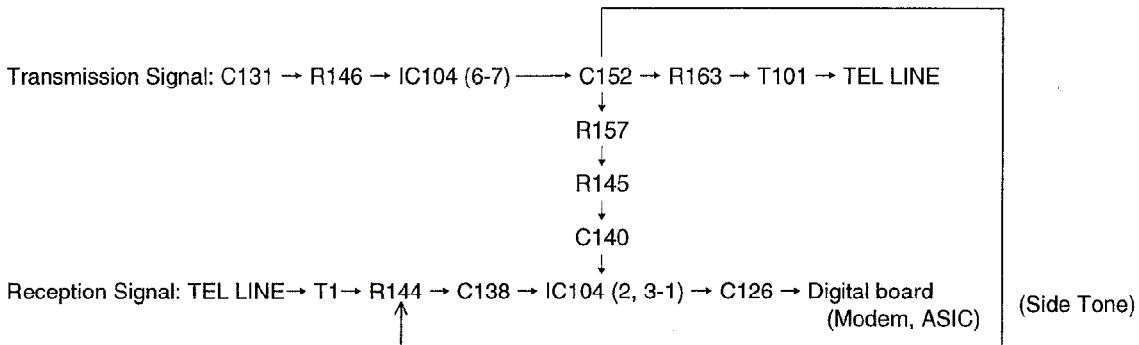
IC501 (42) Break Low Level → CN102 (1) → Q109 ON → PC103 (2) Low level → PC103 (3)(4) ON: DC Loop ON (OFF HOOK Status)

7.5 LINE AMPLIFIER AND SIDE TONE CIRCUITS

1) Circuit Operation

The reception signal received as output from line transformer T101 is given as input to R144, C138 and IC104 pin (2). Then it is input to the reception system at an amplifier gain of 5.9 dB from pin 1.

The transmission signal given as input to IC104 pin (6) via C131, and R146 is amplified to about 13 dB. It is output from pin 7 of IC104 and is transmitted to T101 via C152, R163. Without a side tone circuit, the transmission signal would return to the reception amplifier via C152 and R163. Here, the signal output from IC104 pin (7) passes through C152, R157, R145 and C140 and enters the amplifier IC104 pin (3). This is used to cancel the return portion of the transmission signal. This is the side tone circuit.



7.6 AUTO DISCONNECT CIRCUIT

1) Function

This circuit is used to detect the fact that another telephone connected to the same line is OFF-Hook.

2) Circuit Operation

Tip (Ring) → D115 → Q109 → C192 → D109 → R195 → Q107 → PC102

During this interval C197 charges and the base of Q107 becomes high, and PC102 pin (2) becomes low, causing PC102 to go ON.

If a parallel-connected telephone or external telephone is put into an OFF-HOOK status, charge ceases to flow C192 and the base of Q107 becomes low, causing PC102 to go OFF.

When a line is connected, Q107 and PC102 go ON, causing pin 21 of IC501 (ASIC) of Digital board to go low. When the line is disconnected, Q107 and PC102 go off, causing pin 21 of IC501 (ASIC) of Digital board to go high.

7.7 CPC (Calling Party Control) DETECTION CIRCUIT

1) Function

This circuit detects the signal (cuts the current) output from the converter when the other party finishes ICM recording and goes ON-hook.

TAD detect this signal and disconnects the line. When TAD is operating, pin 4 of PC101 becomes low level.

While detecting the CPC signal, pin 4 of PC101 becomes high level. This is detected, the TAD operation is stopped and the line is disconnected.

8. ITS (Integrated telephone System) and MONITOR SECTION

8.1 GENERAL

The general ITS operation is executed by the special IC103. This IC has handset circuit in 1 chip. The alarm tone, the key tone, and the beep are outputted from the ASIC IC501 (digital board) . At the time of pulse dial operation, the monitor tone is outputted from the ASIC IC501.

8.2 SPEAKER PHONE CIRCUIT

1) Function

The circuit controls the automatic switching of the transmitted and received signals, to and from the telephone line, when the unit is used in the hands-free mode.

2) Circuit Operation

The speakerphone can only provide duplex.

3) Signal path

Refer to page 78.

8.3 HANDSET CIRCUIT

1) Function

This circuit is for conversation of Handset; transmission and reception of the voice via Handset.

2) Signal path

Refer to page 78.

8.4 MONITOR CIRCUIT FOR EACH SIGNALS

1) Function

This circuit is for monitoring of various tone, such as ① DTMF tone, ② Alarm/Beep/Key tone/Bell ③ Dummy ring back tone.

2) Signal path

Refer to pages 78 and 79.

9. ATAS (Automatic Telephone Answering System) SECTION

1) Function

The ATAS main operation is executed by the special IC505 (MODEM) and IC514 (CODEC), IC513 (FLASH MEMORY) control signals are input from ASIC IC103.

- ① Greeting/Message Recording
- ② ICM Recording
- ③ Greeting/Message/ICM play to speaker
- ④ Greeting/Message/ICM play to Tel Line
- ⑤ Vox Detection

2) Signal Path

Refer to pages 78 and 79.

8. ITS (Integrated telephone System) and MONITOR SECTION

8.1 GENERAL

The general ITS operation is executed by the special IC103. This IC has handset circuit in 1 chip. The alarm tone, the key tone, and the beep are outputted from the ASIC IC501 (digital board) . At the time of pulse dial operation, the monitor tone is outputted from the ASIC IC501.

8.2 SPEAKER PHONE CIRCUIT

1) Function

The circuit controls the automatic switching of the transmitted and received signals, to and from the telephone line, when the unit is used in the hands-free mode.

2) Circuit Operation

The speakerphone can only provide duplex.

3) Signal path

Refer to page 78.

8.3 HANDSET CIRCUIT

1) Function

This circuit is for conversation of Handset; transmission and reception of the voice via Handset.

2) Signal path

Refer to page 78.

8.4 MONITOR CIRCUIT FOR EACH SIGNALS

1) Function

This circuit is for monitoring of various tone, such as ① DTMF tone, ② Alarm/Beep/Key tone/Bell ③ Dummy ring back tone.

2) Signal path

Refer to pages 78 and 79.

9. ATAS (Automatic Telephone Answering System) SECTION

1) Function

The ATAS main operation is executed by the special IC505 (MODEM) and IC514 (CODEC), IC513 (FLASH MEMORY) control signals are input from ASIC IC103.

- ① Greeting/Message Recording
- ② ICM Recording
- ③ Greeting/Message/ICM play to speaker
- ④ Greeting/Message/ICM play to Tel Line
- ⑤ Vox Detection

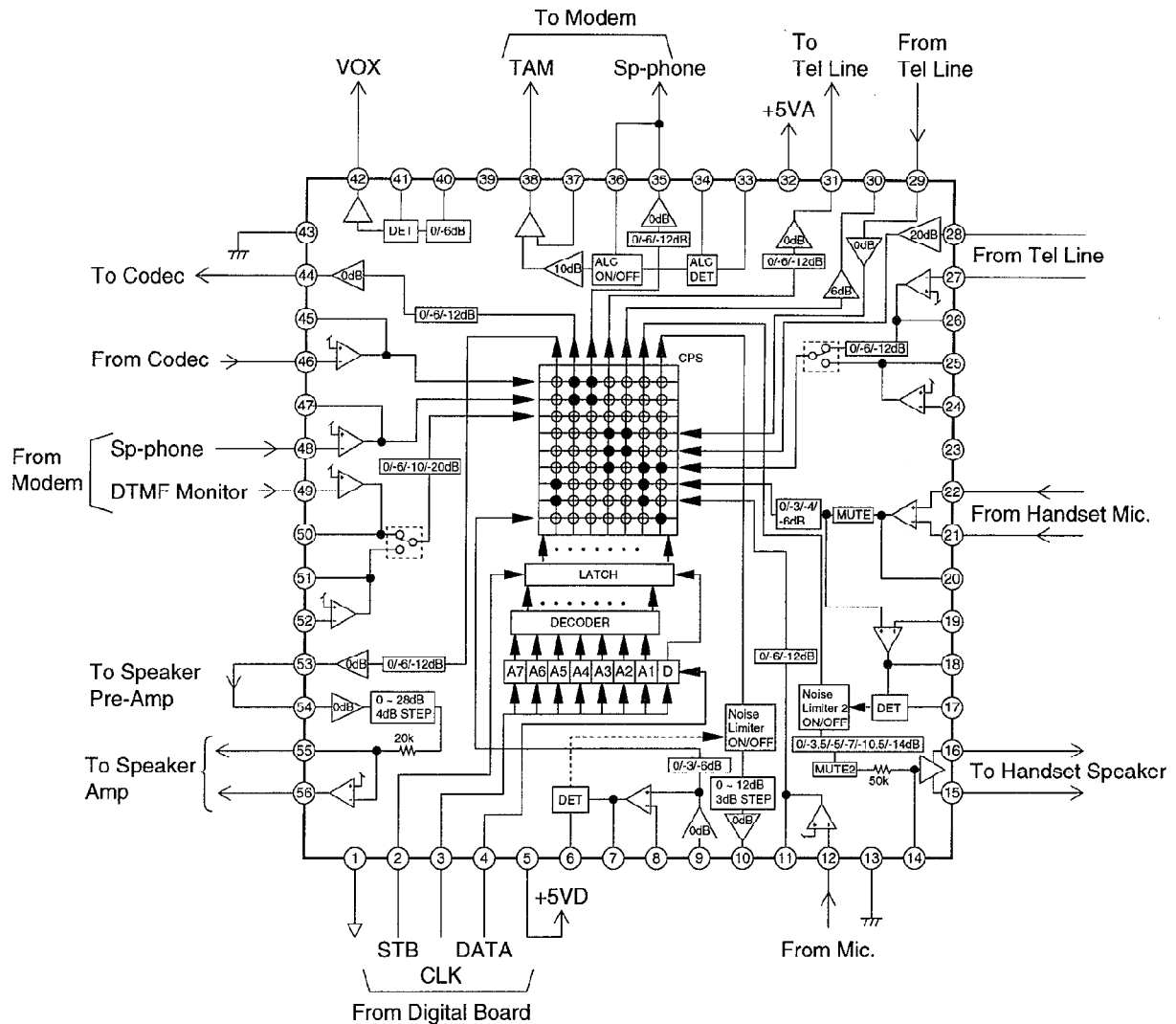
2) Signal Path

Refer to pages 78 and 79.

10. ANALOG GATE ARRAY (IC103 on the Analog Board)

This IC can perform signal route switching and level adjustments for various types of analog signals. This IC incorporates a cross-point switch (CPS), electronic volume, auto level controller (ALC) circuit for recording, attenuation circuit. The C.P.S. of this IC is controlled by sending data from digital board.

10.1 Internal Connections



10.2 EXPLANATION OF ANALOG GATE ARRAY (IC103 on the Analog Board)

No.	Name	Function	No.	Name	Function
1	D-GND	Digital ground	29	LINEIN	Line amp input
2	STR	Strobe input	30	DHOUT	Not used
3	CLOCK	Clock input	31	LINEOUT	Line amp output
4	DATA	Data input	32	VCC	Analog power supply
5	VDD	Logic power supply	33	ALCIN	ALC input
6	NL1DET	Not used	34	ALCDET	ALC output
7	NL1OUT	Not used	35	PROUT2	Preamplifier output2
8	NL1IN	Not used	36	RECIN	Record input
9	CLIN	Not used	37	RECPRIN	Record preamp input
10	CLOUT	Not used	38	RECPROUT	Record preamp output
11	MICOUT	Mic amp output	39	VREF2	Internal reference voltage output
12	MICIN	Mic amp input	40	VOXIN	VOX input
13	GND	Analog ground	41	VOXDET	VOX detection adjustment
14	RIN	HS receiver amp input	42	VOXOUT	VOX output
15	ROUT1	HS receiver amp output1	43	GND2	Analog ground
16	ROUT2	HS receiver amp output2	44	LSRXOUT	SP phone TX amp output from mic
17	NL2DET	HS TX detection adjustment	45	LSTXOUT	SP phone RX amp output from codec
18	NL2OUT	HS TX detection amp input	46	LSTXIN	SP phone RX amp inverting input from codec
19	NL2IN	HS TX detection amp output	47	PLYOUT	SP phone TX amp output from modem
20	HSMICOUT	HS mic amp output	48	PLYIN	SP phone TX amp inverting input from modem
21	MSMIC-	HS mic amp -input	49	TONE1IN	Tone 1 amp input
22	HSMIC+	HS mic amp +input	50	TONE1OUT	Tone 1 amp output
23	VREF1	Analog internal reference voltage	51	TONE2OUT	Tone 2 amp output
24	CIDIN	Caller ID amp input	52	TONE2IN	Tone 2 amp input
25	CIDOUT	Caller ID amp output	53	PROUT1	Preamplifier output1
26	EXTOUT	EXT amp output	54	SPPRIN	Speaker preamp input
27	EXTIN	EXT amp input	55	SPIN	Speaker amp input
28	DHIN	Monitor input	56	SPOUT	Speaker amp output

11. OPERATION BOARD SECTION

The unit consists of a LCD (Liquid crystal display), KEYS and LEDs (light-emitting diodes). They are controlled by the Gate Array (IC301) and ASIC (IC501: on the DIGITAL BOARD). (Fig.-a)

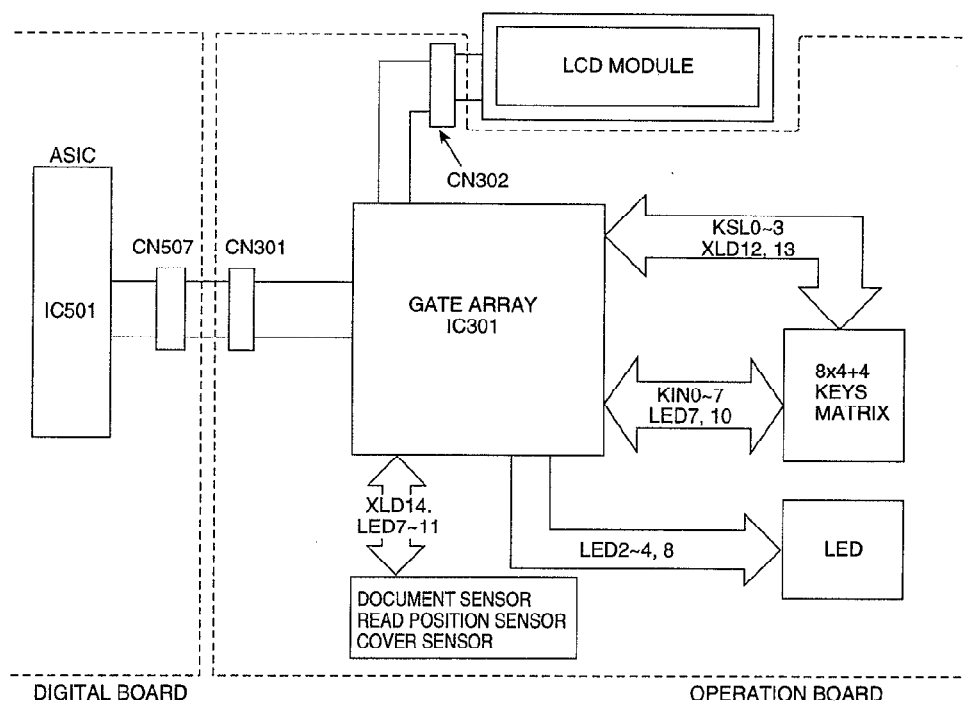


Fig-a

Key Matrix

	KIN0	KIN1	KIN2	KIN3	KIN4	KIN5	KIN6	KIN7
KSL0	SW301 ONE1, 5	SW305 ONE4, 9	SW309 STOP	SW313 REDIAL/PAUSE	SW317 *	SW321 0	SW325 #	SW329 AUTO ANSWER
KSL1	SW302 2, 7	SW306 ONE5, 10	SW310 START/COPY/SET	SW314 SP-PHONE	SW318 7	SW322 8	SW326 9	SW330 V
KSL2	SW303 ONE3, 8	SW307 LOWER	SW311 MENU	SW315 MUTE	SW319 1	SW323 2	SW327 3	SW331 ^
KSL3	SW304 RESOLUTION	SW308 DIRECTORY PROGRAM	SW312 HELP	SW316 FLASH	SW320 4	SW324 5	SW328 6	SW332 FILM REMAINING

	LED7	LED10
XLD12	SW336 IQ-FAX	SW335 CALLER ID SEARCH
XLD13	SW334 PLAY MESSAGES	SW333 ERASE

Ref. No of operation Board

SENSOR

	LED7	LED10	LED11
XLD14	PC301 DOCUMENT TOP SENSOR	PC302 DOCUMENT SET=1	PC303 COVER OPEN=1

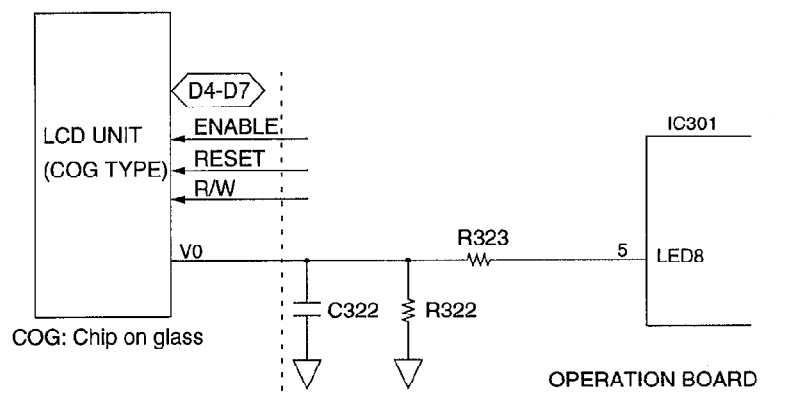
LED

	LED2	LED3	LED4	LED8
	LED301 SP-PHONE	LED302 TAD/FAX	LED303 PLAY MESSAGES	LCD CONT 0=D 1=N

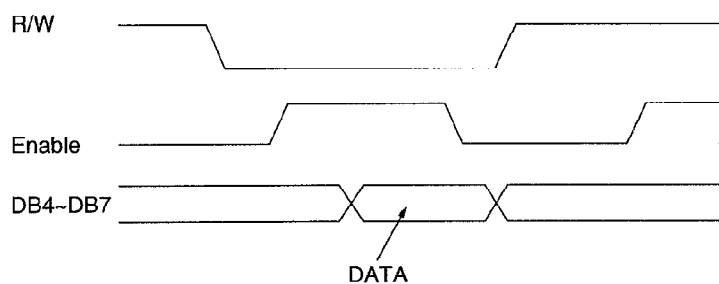
12. LCD SECTION

The Gate Array (IC301) only needs to write the ASCII code from the data bus (D4~D7). V0 is supplied for the crystal drive. R323 and R322 are density control resistors. Consequently, in this unit, the timing (positive clock) is generated by the LCD interface circuitry in the gate array (IC301).

Circuit Diagram



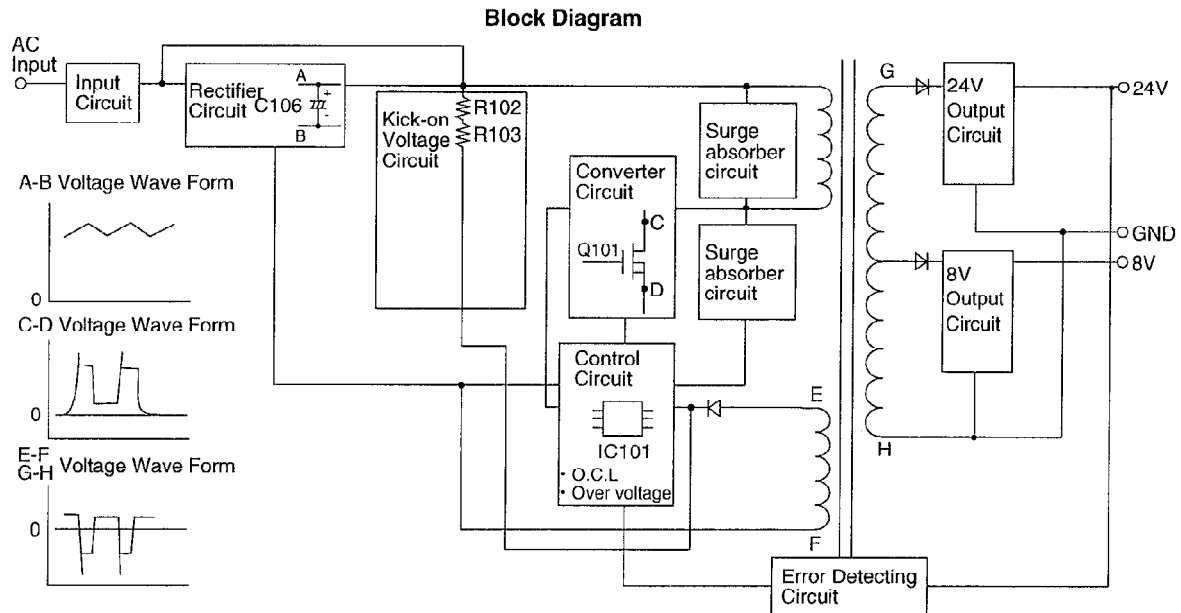
Timing Chart



Density	Norma	Dark
LED8 (IC301-5pin)	H	L

13. POWER SUPPLY BOARD SECTION

This power supply board uses the switching regulator method. The block diagram is as follows.



[Input Circuit]

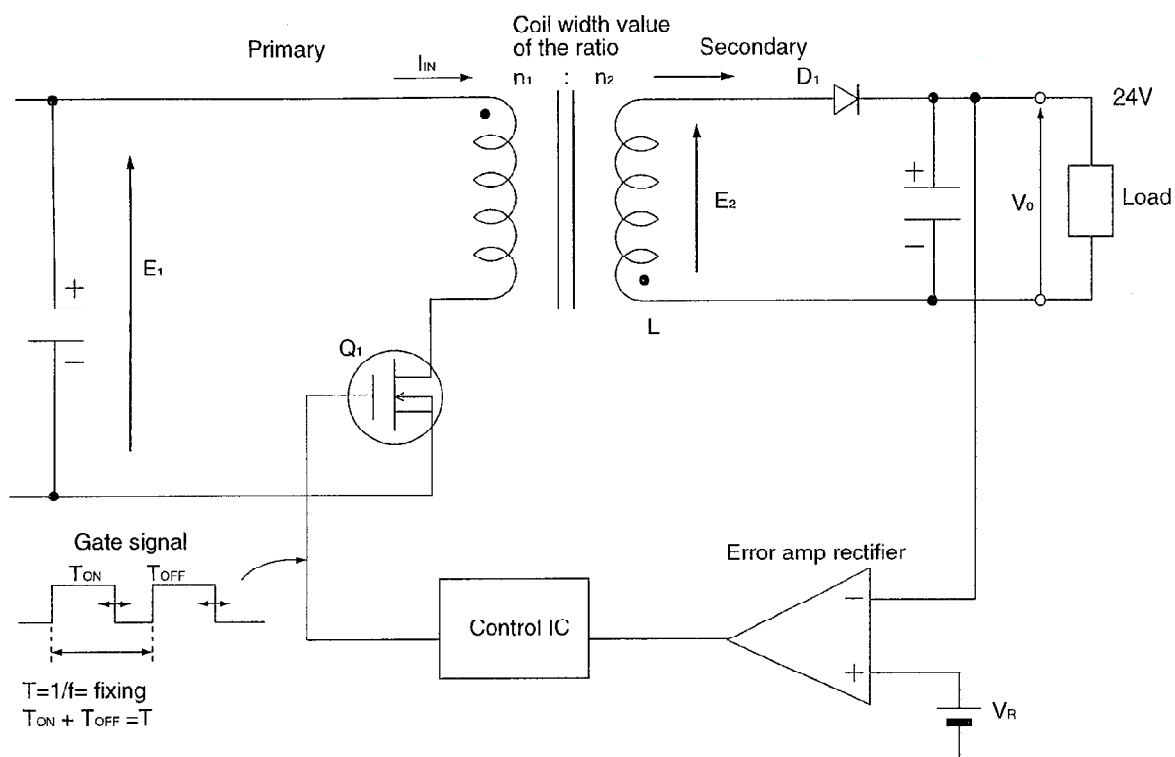
The input current goes into the input rectifier circuit through the filter circuit. The filter circuit decreases the noise voltage and the noise electric field strength.

[Rectifier Circuit]

The input current is rectified by D101, D102, D103 and D104 and charges C106 to make DC voltage. Then it supplies power to the converter circuit.

[Kick-on voltage circuit]

Bias is applied to the Q101 gate via this circuit when the AC power is turned on and Q101 begins operating.



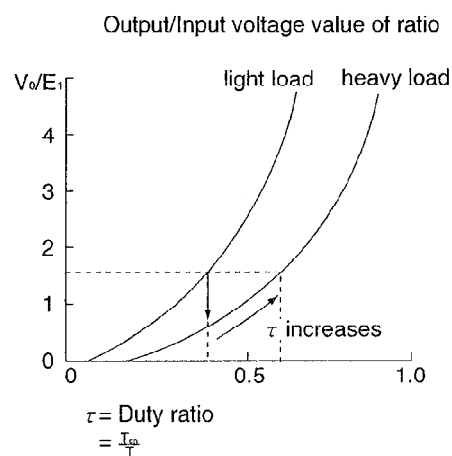
Next, we will explain how the Power supply unit is controlled.
 The control method of this power supply unit is pulse width modulation.

When Q_1 is ON, the energy is charged in the transfer primary coil according to E_1 . When Q_1 is OFF, the energy is output from the secondary transfer as follows.

$L \rightarrow D_1 \rightarrow \text{Load} \rightarrow L$

Then the power is supplied to the Load. When Q_1 is ON, power is not output from the secondary side. The output voltage is fed back in the control IC according to the error amp rectifier. Then depending on how T_{ON} is controlled, stabilization occurs. Also, when the current load becomes too large, in order to decrease the voltage output, the increase in τ is controlled and the output voltage is stabilized.

Therefore, basically the timing: T_{ON}/T_{OFF} of Q_1 controls the output voltage.



KX-FP270

[Surge Absorber Circuit]

This circuit is for absorbing surge voltage generated by the transformer.

[Control Circuit and Detecting Circuit]

The control circuit amplifies the output with increased voltage detected in the error detecting circuit. Then it drives the main transistor.

In this power supply, the duty ratio is defined by changing the ON period of the main transistor.

This is shown as follows.

When the output voltage of the 24V circuit increases, the current of the photo coupler PC101 increases, the pulse width of the output control IC becomes narrower and the ON period of Q101 becomes shorter.

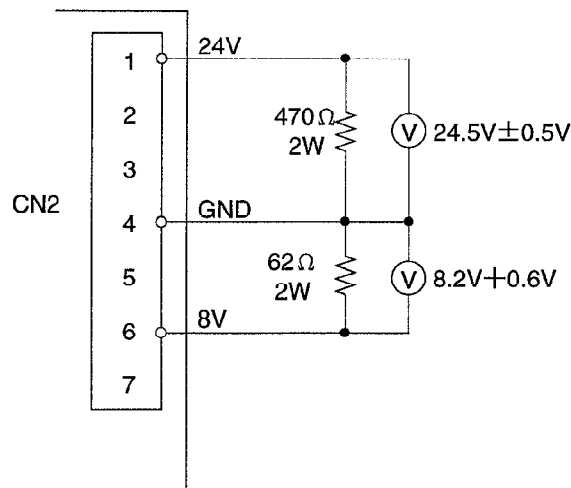
[Over Current Limiter (O.C.L)]

The highest drain current (Q101) is limited by a limiter circuit (IC101) of 24V. The 24V output is limited by this circuit.

[Over Voltage Circuit]

If the 24V output increases because the error detecting circuit or control circuit is broken, IC101 will recognize this signal and output becomes 0V.

Dummy load method (to quickly check the power supply output)

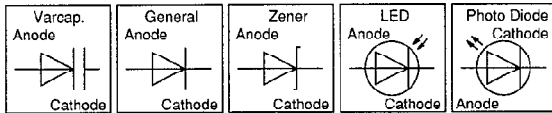


FOR THE SCHEMATIC DIAGRAMS


Note:

1. DC voltage measurements are taken with an oscilloscope or a tester with a ground .
2. The schematic diagrams and circuit board may be modified at any time with the development of new technology.

3.



Important safety notice

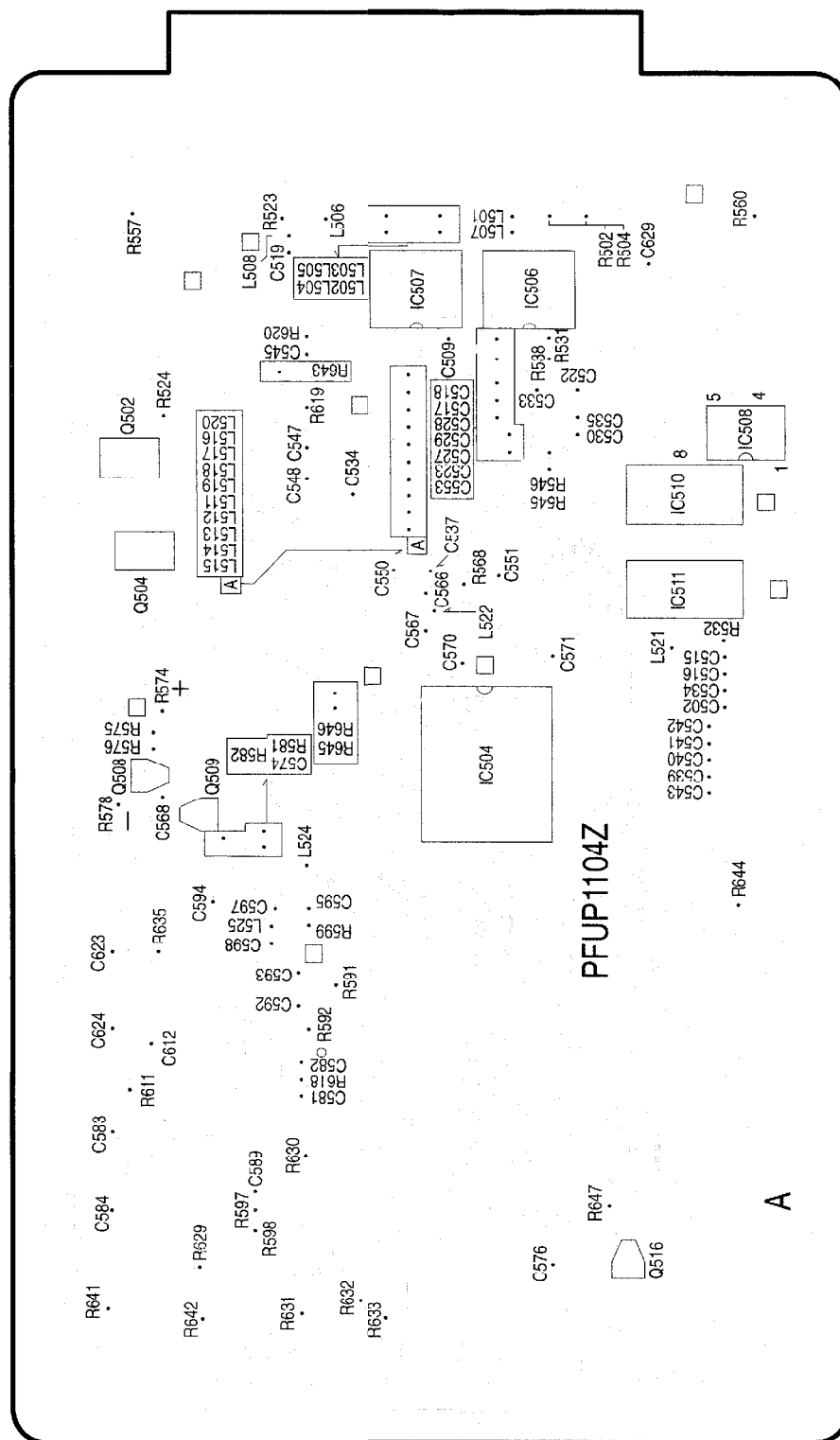
Components identified by  mark have special characteristics important for safety. When replacing any of these components, use only the manufacturer's specified parts.

KX-FP270

MEMO

PRINTED CIRCUIT BOARD (DIGITAL BOARD)

(BOTTOM VIEW)



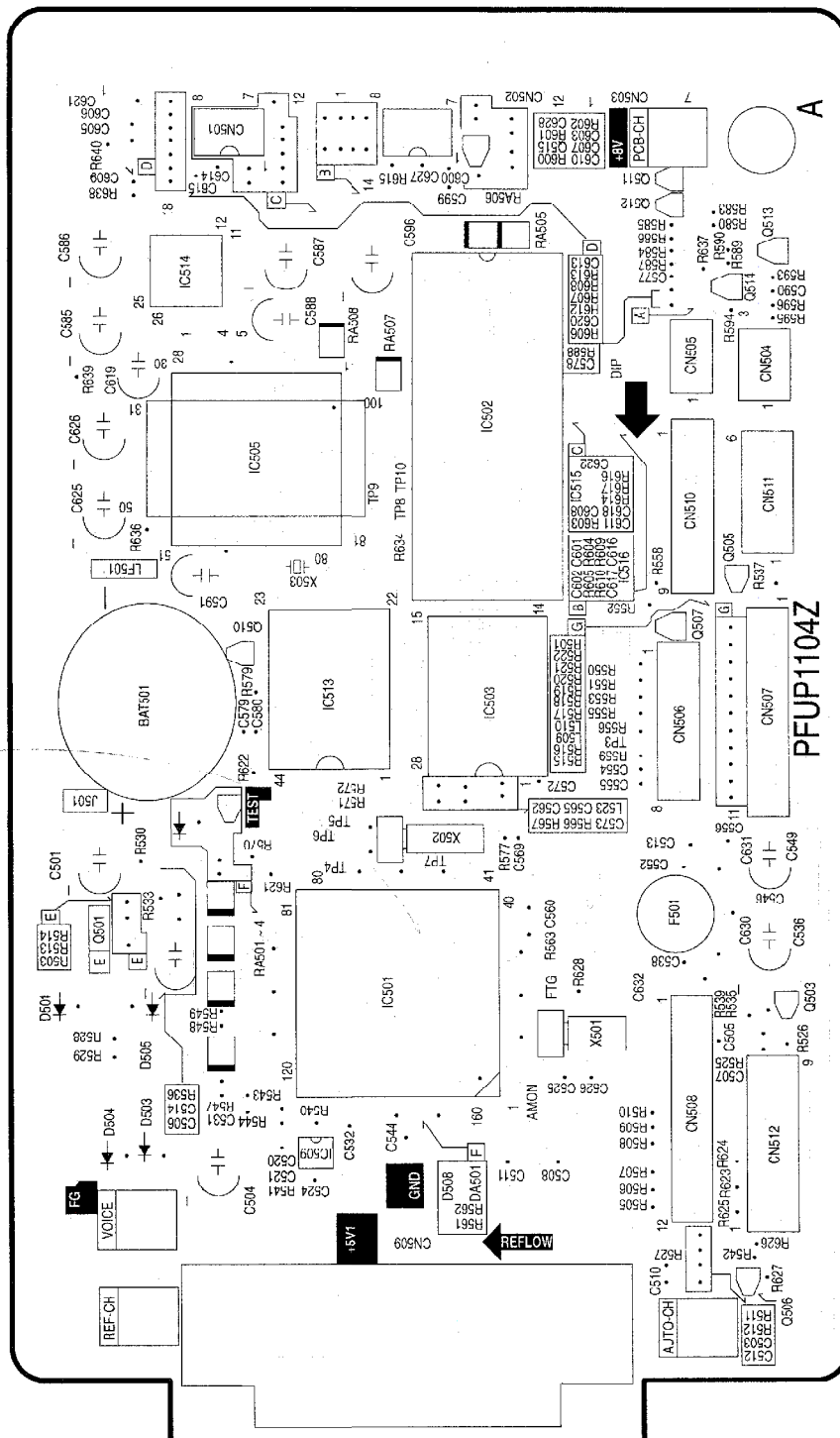
Notes:

- Notes:**
1. The circuit shown in _____ on the conductor indicates printed circuit on the back side of the printed circuit board.
 1. The circuit shown in _____ on the conductor indicates printed circuit on the front side of the printed circuit board.

PRINTED CIRCUIT DIAGRAM (DIGITAL BOARD)

(COMPONENT VIEW)

Pin No.	Waveform	Pin No.	Waveform
7, 0		9, 5	



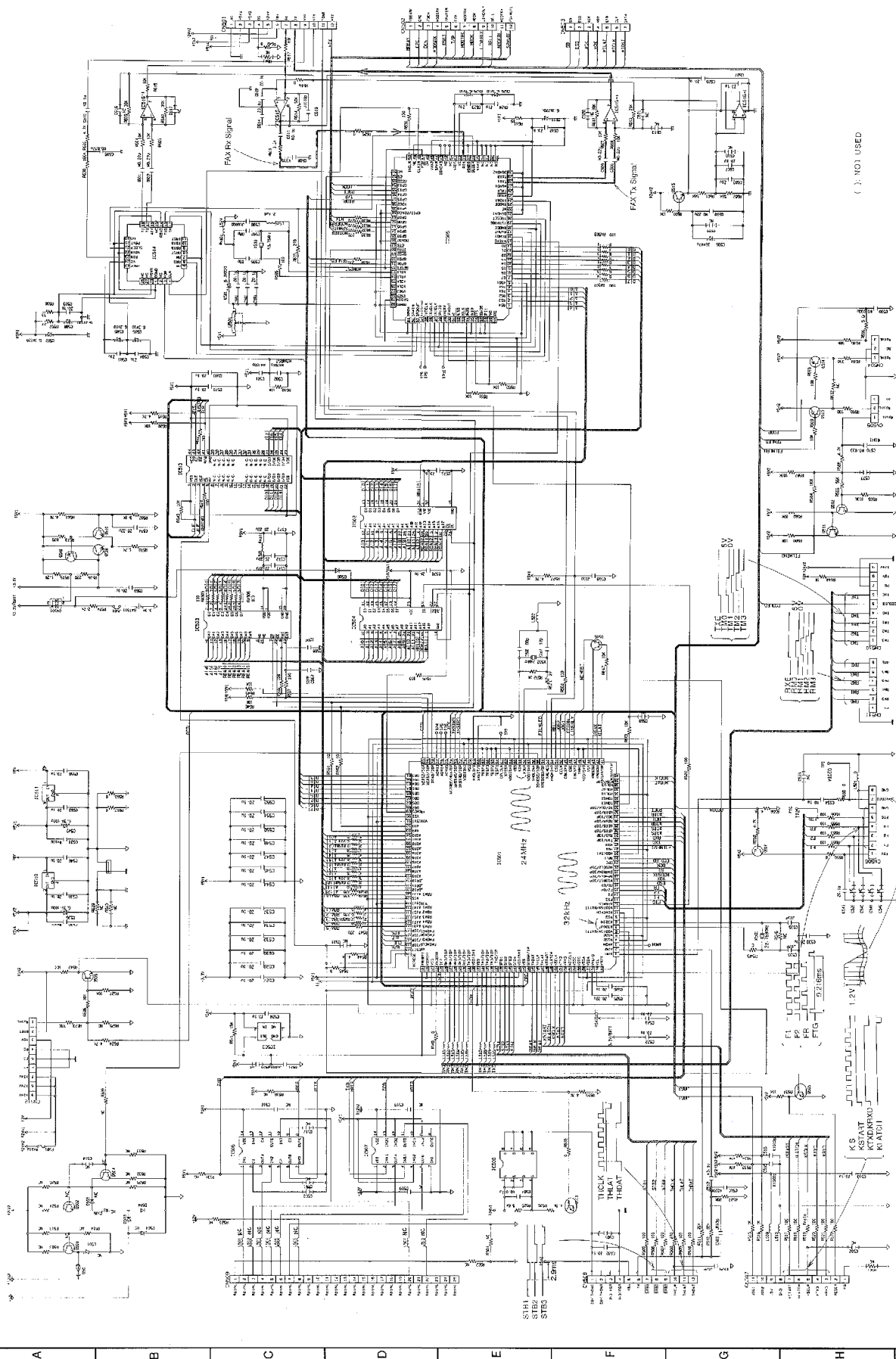
Notes:

- Notes:**
1. The circuit shown in _____ on the conductor indicates printed circuit on the back side of the printed circuit board.
 2. The circuit shown in _____ on the conductor indicates printed circuit on the front side of the printed circuit board.

KX-FP270

KX-FP270

SCHEMATIC DIAGRAM (DIGITAL CIRCUIT)



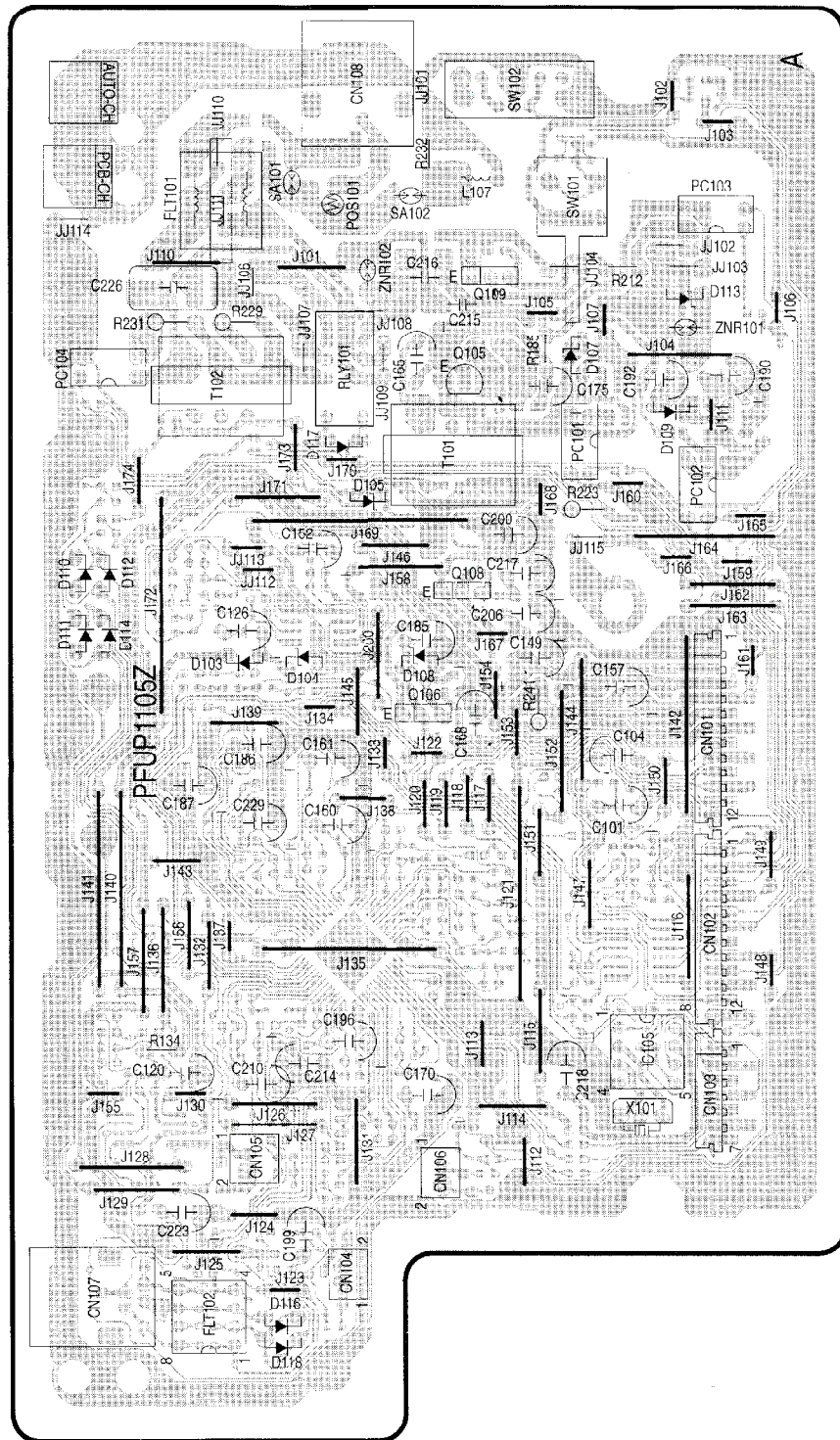


KX-FP270

KX-FP270

PRINTED CIRCUIT BOARD (ANALOG BOARD)

(COMPONENT VIEW)

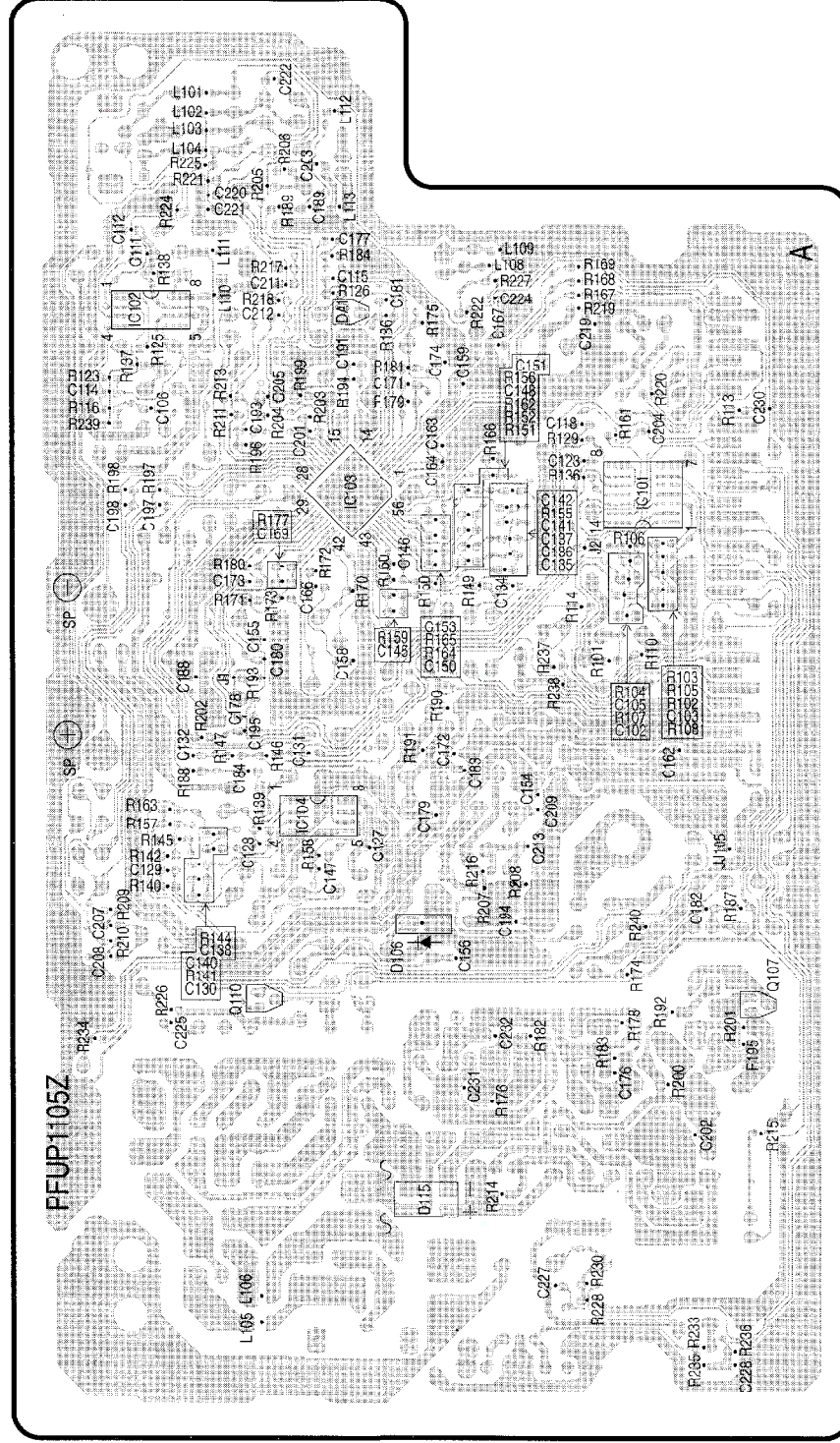


KX-FP270

KX-FP270

PRINTED CIRCUIT BOARD (ANALOG BOARD)

(BOTTOM VIEW)

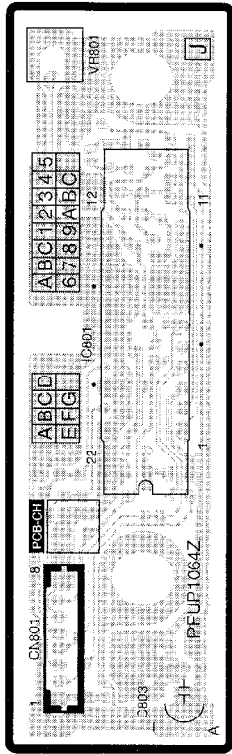
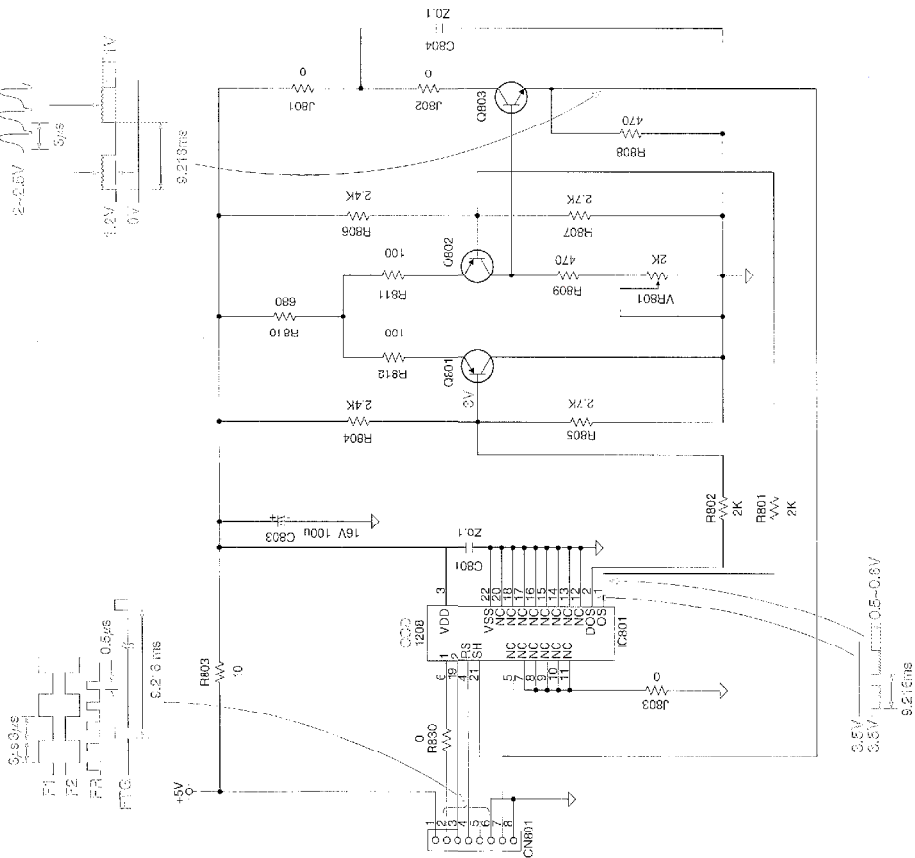


SCHEMATIC DIAGRAM AND PRINTED CIRCUIT BOARD (CCD)

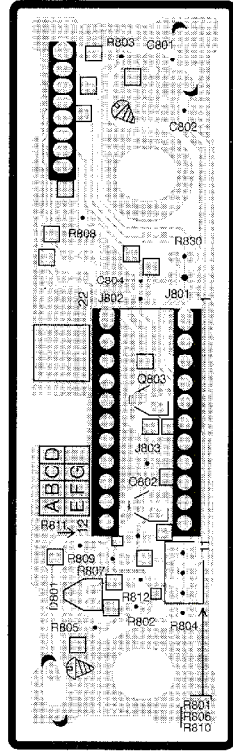
CCD CIRCUIT

CCD BOARD

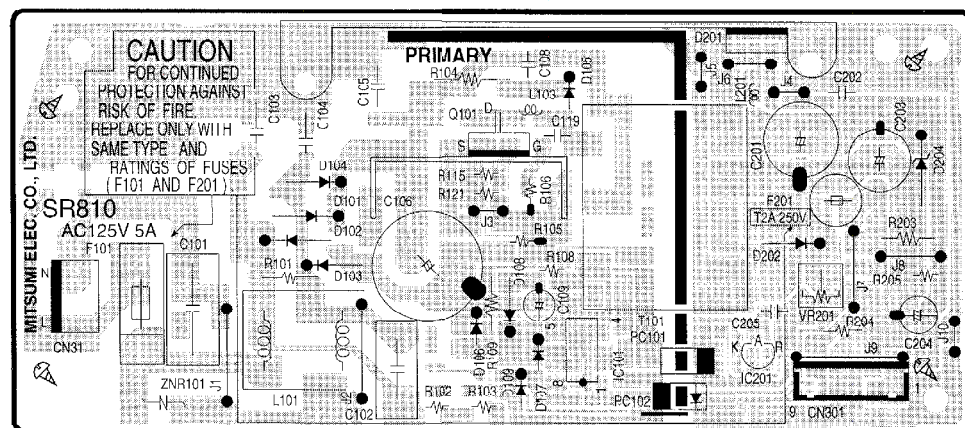
(COMPONENT VIEW)



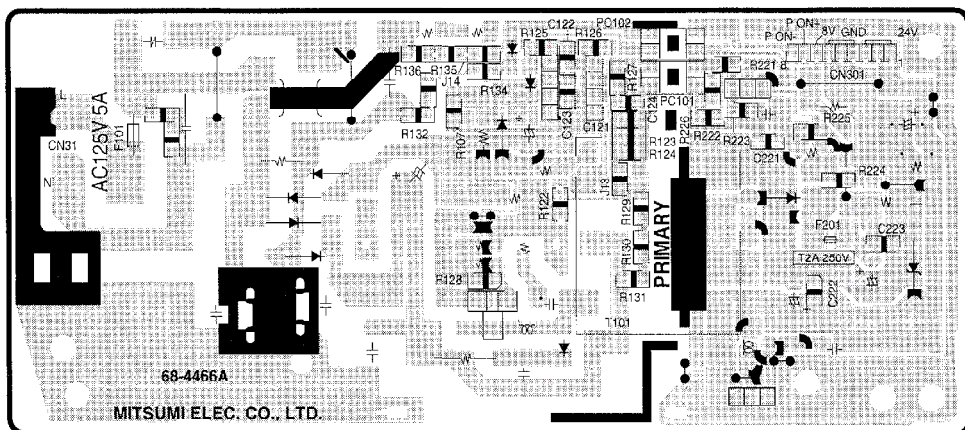
(BOTTOM VIEW)



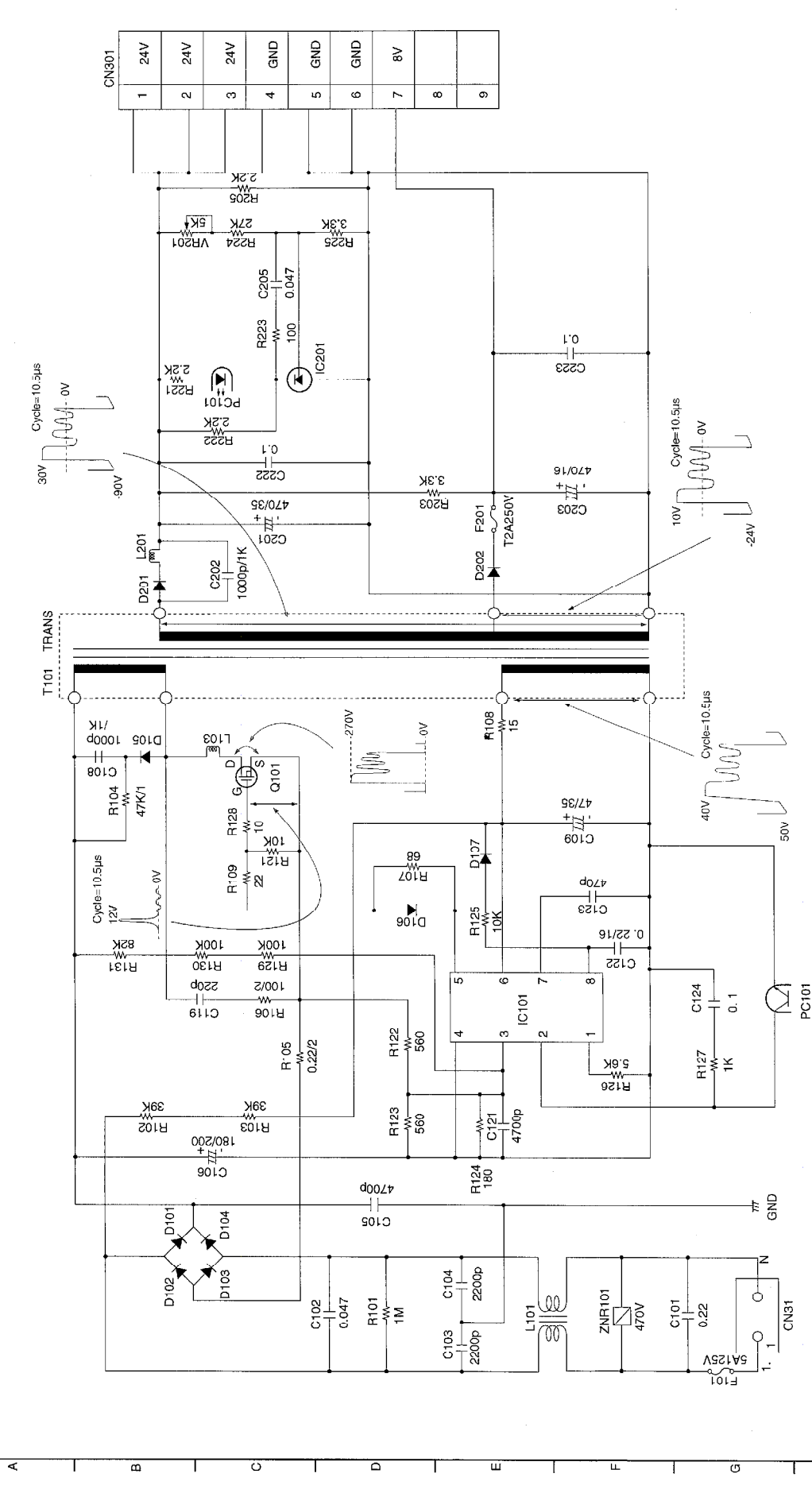
(COMPONENT VIEW)



(BOTTOM VIEW)



SCHEMATIC DIAGRAM (SWITCHING POWER SUPPLY)

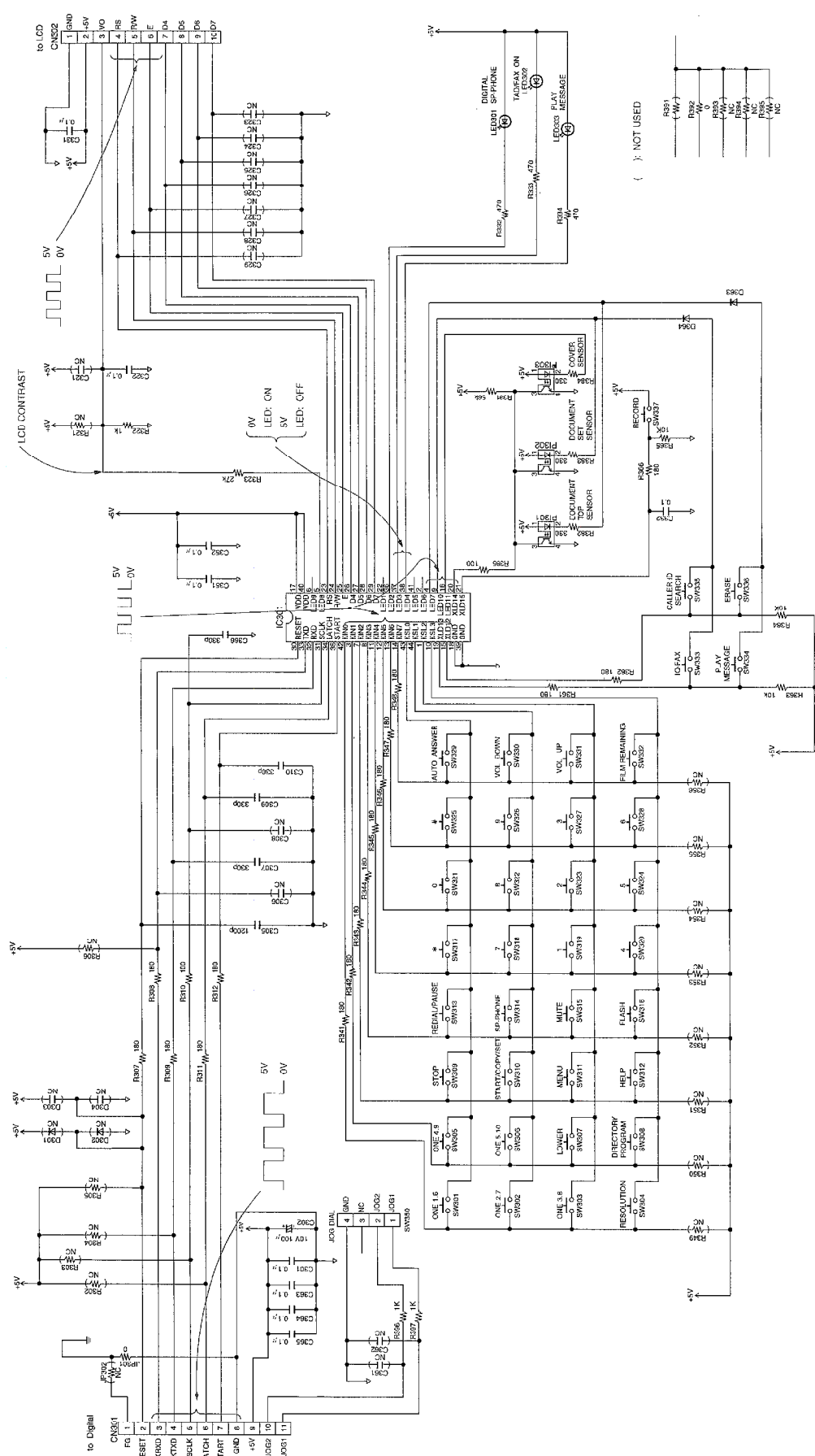


Note:
When measuring the waveform on the primary circuit of the Switch Power Supply Board, be sure to insulate the ground of the oscilloscope's probe from the ground of its power supply.

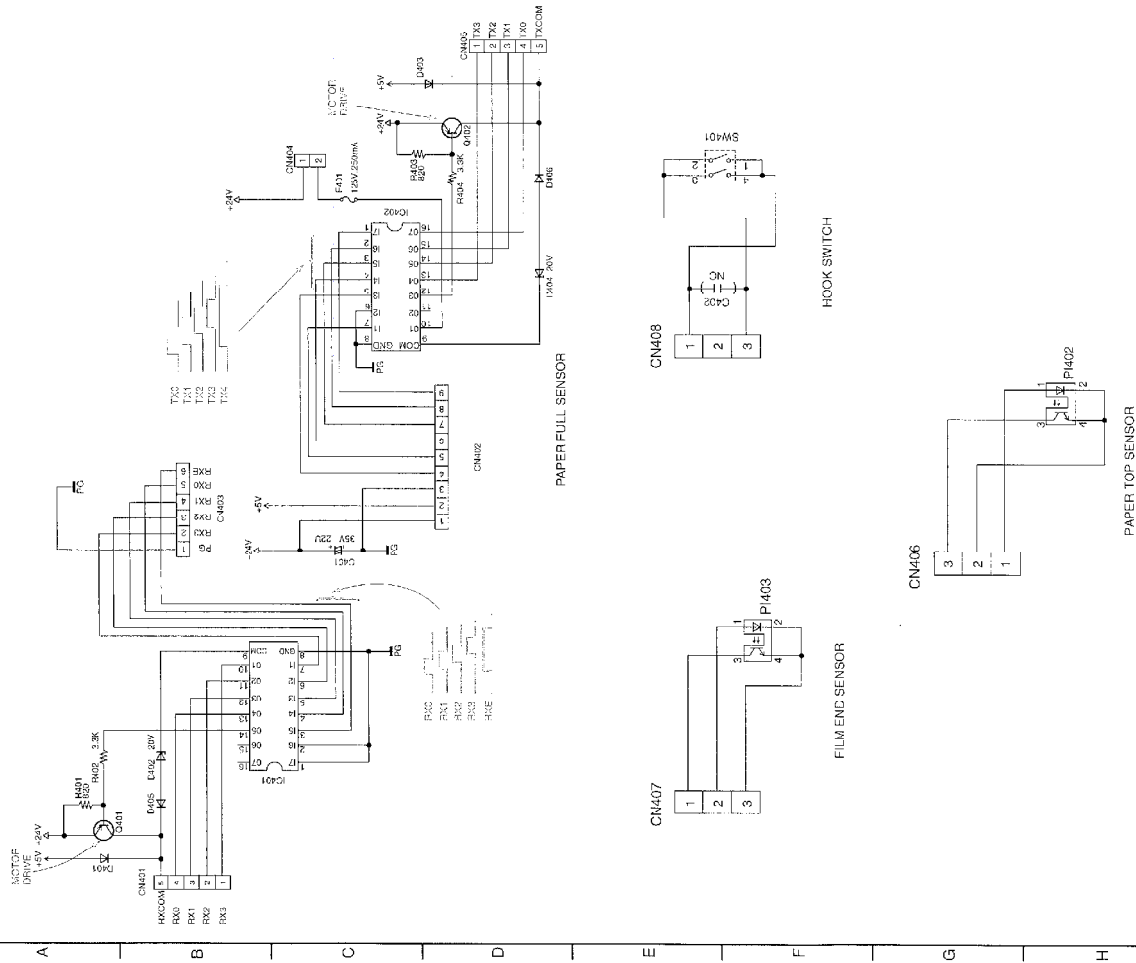
PRINTED CIRCUIT BOARD (OPERATION BOARD)



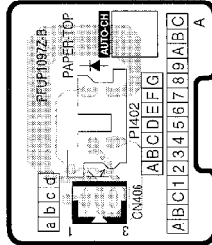
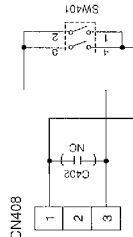
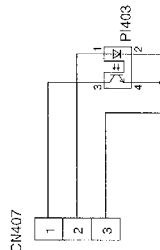
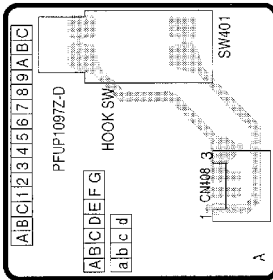
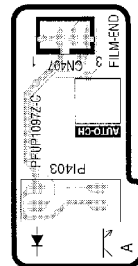
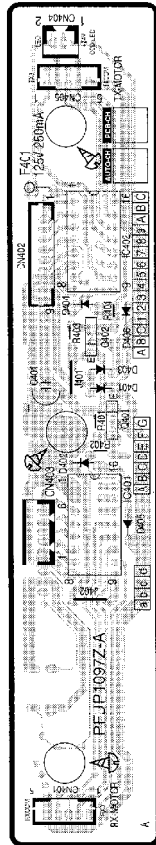
SCHEMATIC DIAGRAM (OPERATION CIRCUIT)



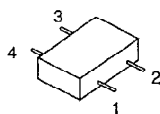
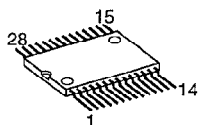
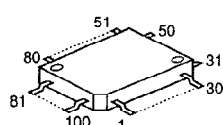
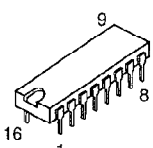
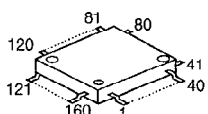
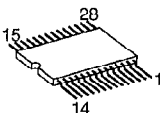
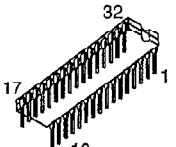
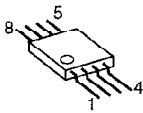
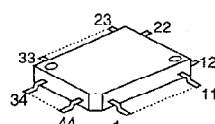
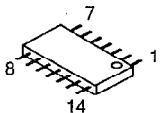
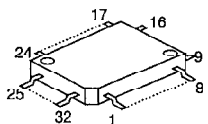
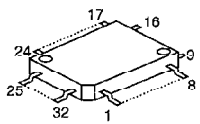
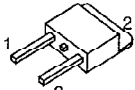
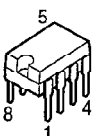
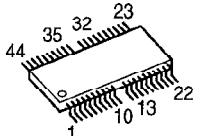
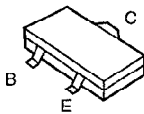
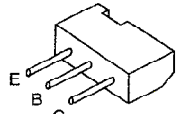
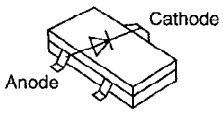
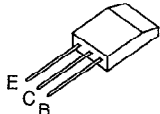
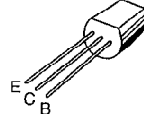
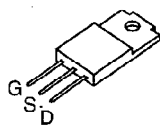
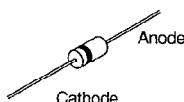
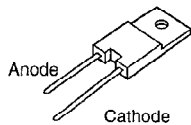
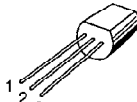
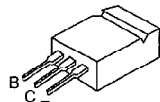
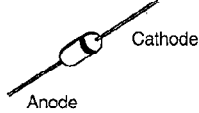
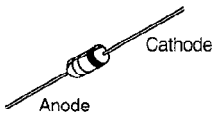
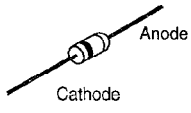
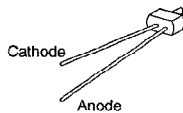
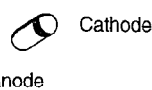
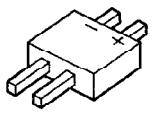
SCHEMATIC DIAGRAM/PRINTED CIRCUIT BOARD (SENSOR)



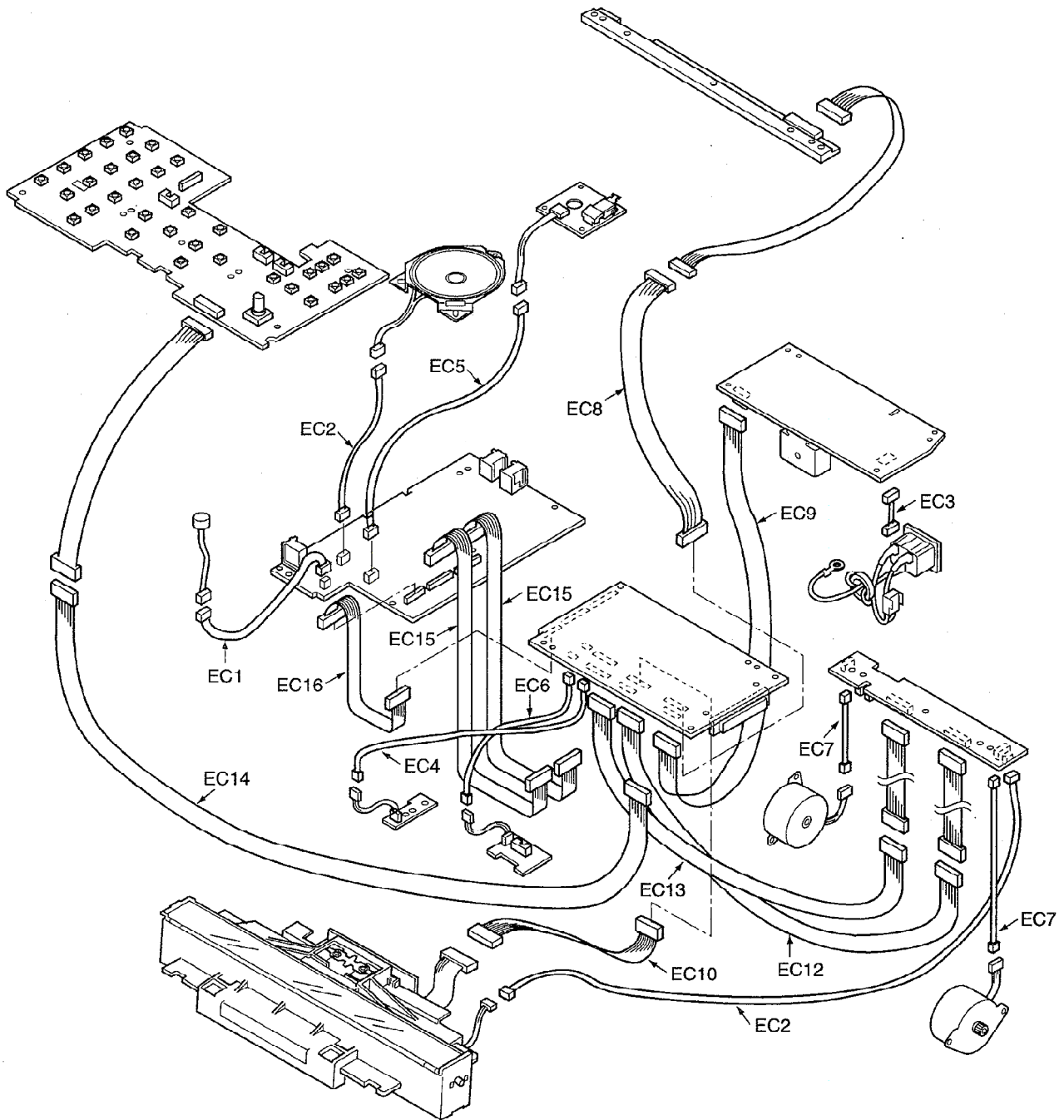
(COMPONENT VIEW)



TERMINAL GUIDE OF THE IC'S TRANSISTORS AND DIODES

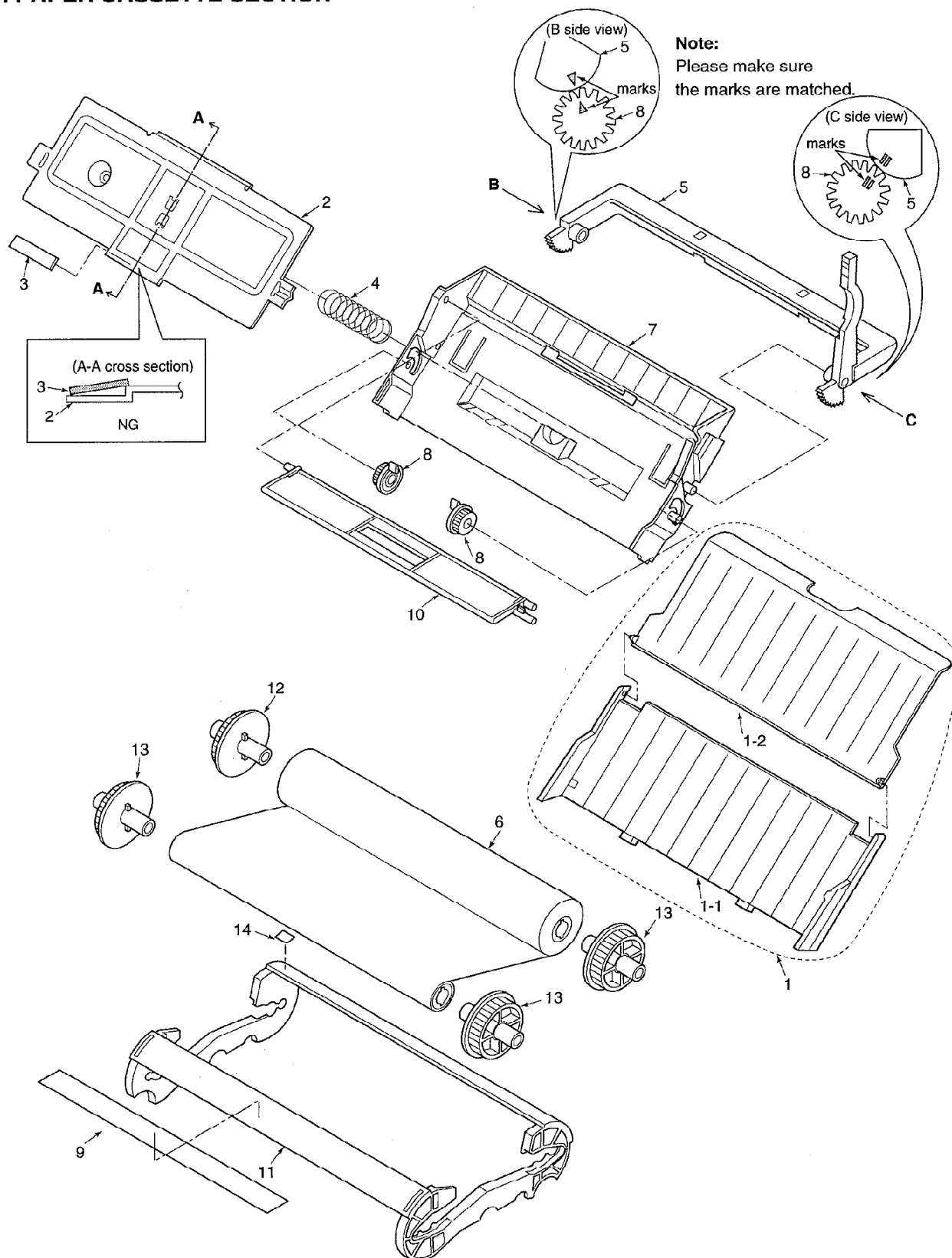
 <p>PFVIS80842AN</p>	 <p>PFVIM4480CF</p>	 <p>PFVIR667555</p>	 <p>PQVIBA12003</p>	 <p>PFVIM66395M1</p>
 <p>PFVIGM6256FF</p>	 <p>PFWIFP270M</p>	 <p>PQVINJM2113M PQVINJM4558M PFVINJM4558M</p>	 <p>MN53007QAF</p>	 <p>PQVITC4066BF</p>
 <p>PFVIR10485</p>	 <p>AN6382NFA</p>	 <p>PFVIMC78M05C</p>	 <p>PFVIFA5317P</p>	 <p>PFVIKM29N04T</p>
 <p>PQVTDTC143E PQVTDTC114EU 2SB1197K, 2SB1218A, 2SD1819A, 2SB709A</p>	 <p>2SB1322, 2SD1921Q</p>	 <p>MA141WK</p>	 <p>2SA1627</p>	 <p>2SC2235</p>
 <p>PQVTFS10KM10</p>	 <p>PQVDERA1802 PFVDAG01A</p>	 <p>PFVDSF5LC20U</p>	 <p>AN1431T</p>	 <p>2SD2136</p>
 <p>1SS119</p>	 <p>PQVDHVS2B1, MA4056</p>	 <p>PFVDD1N4005 MA4220, PFVDD1NL20U MA7200, 1SS147</p>	 <p>PQVDR325CA47</p>	 <p>RLS71</p>
 <p>PQVDS1ZB40F1</p>				

FIXTURES AND TOOLS



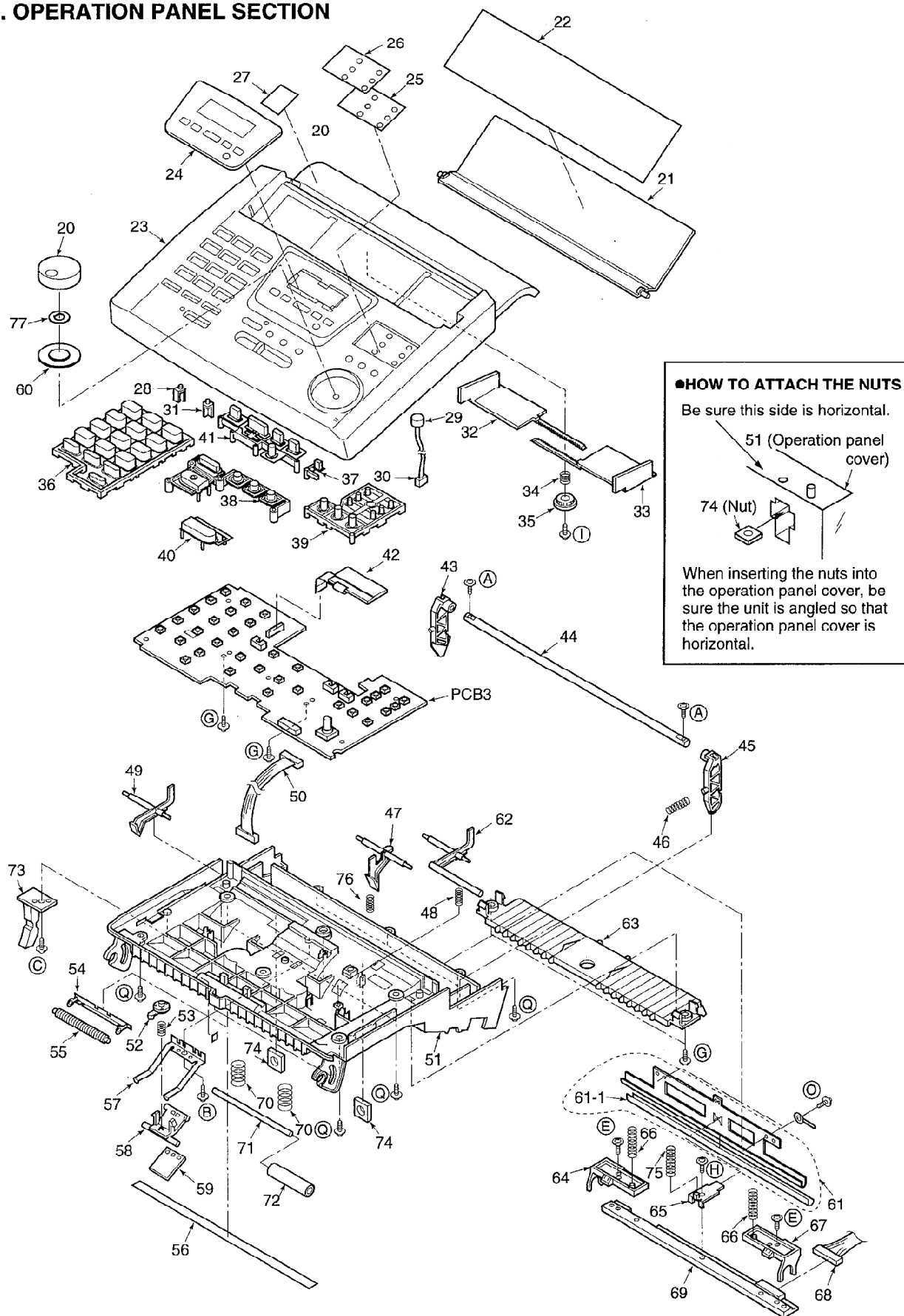
CABINET, MECHANICAL AND ELECTRICAL PARTS LOCATION

1. PAPER CASSETTE SECTION

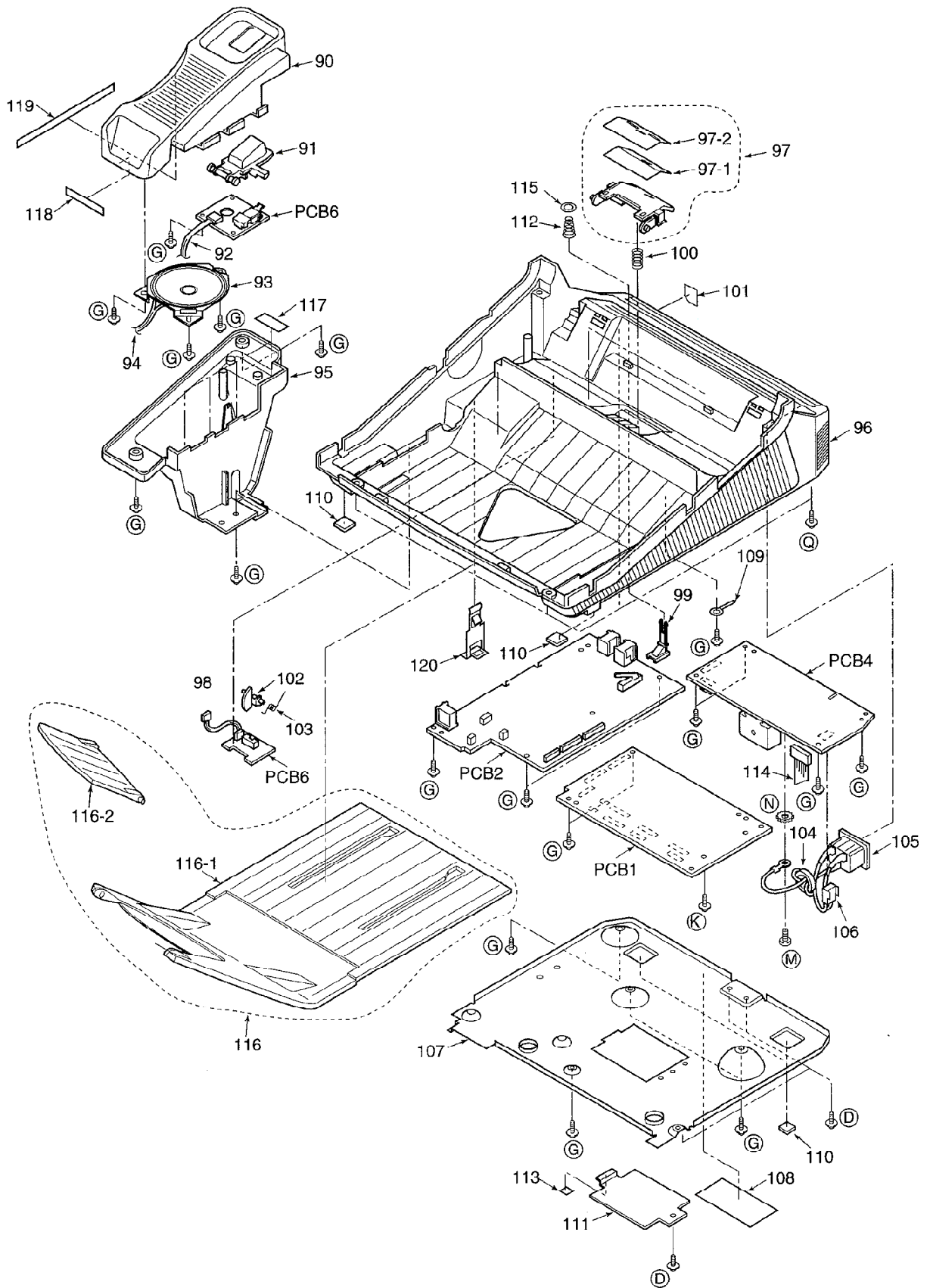


KX-FP270

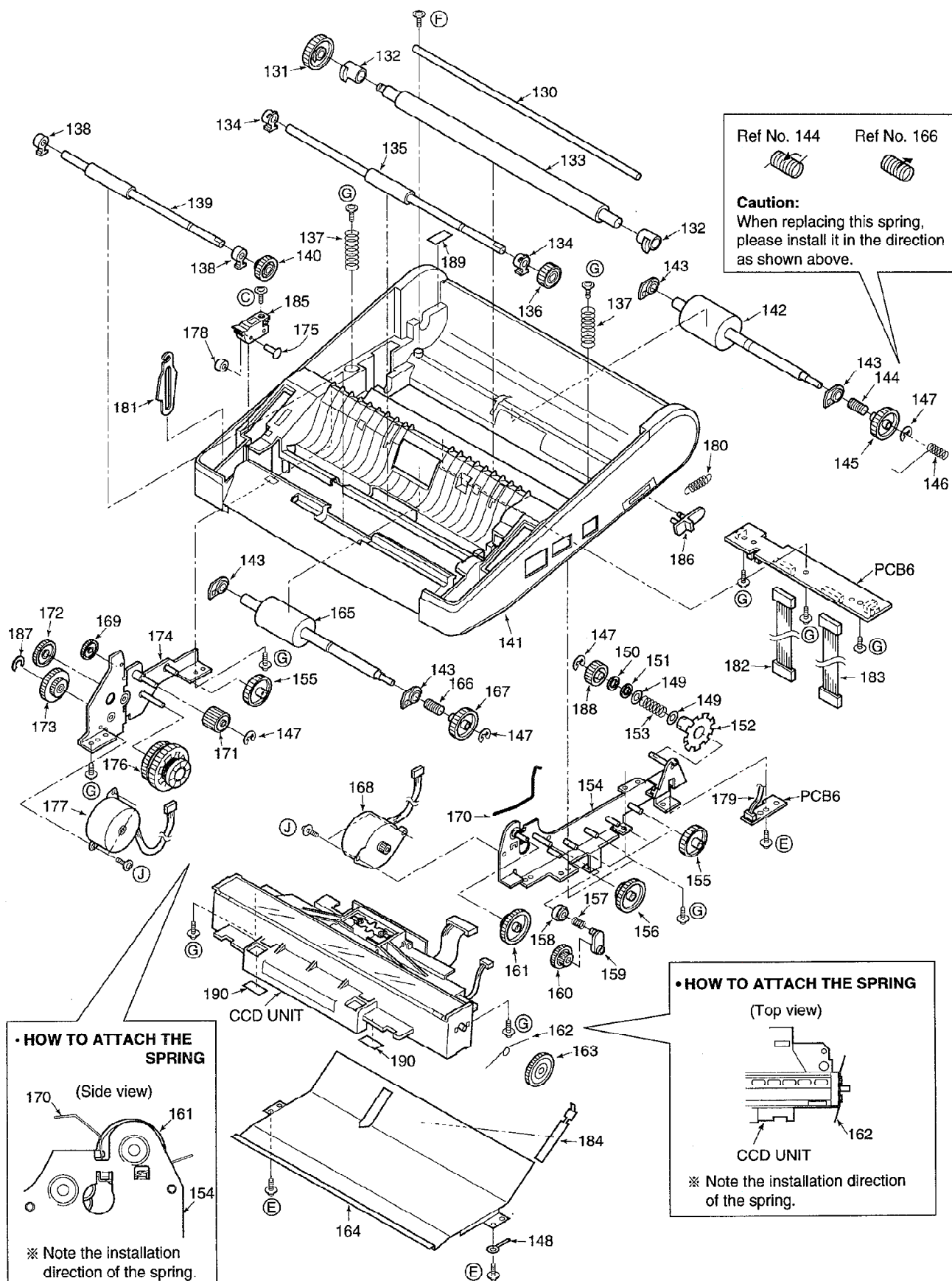
2. OPERATION PANEL SECTION



3. UPPER CABINET/P.C.B. SECTION



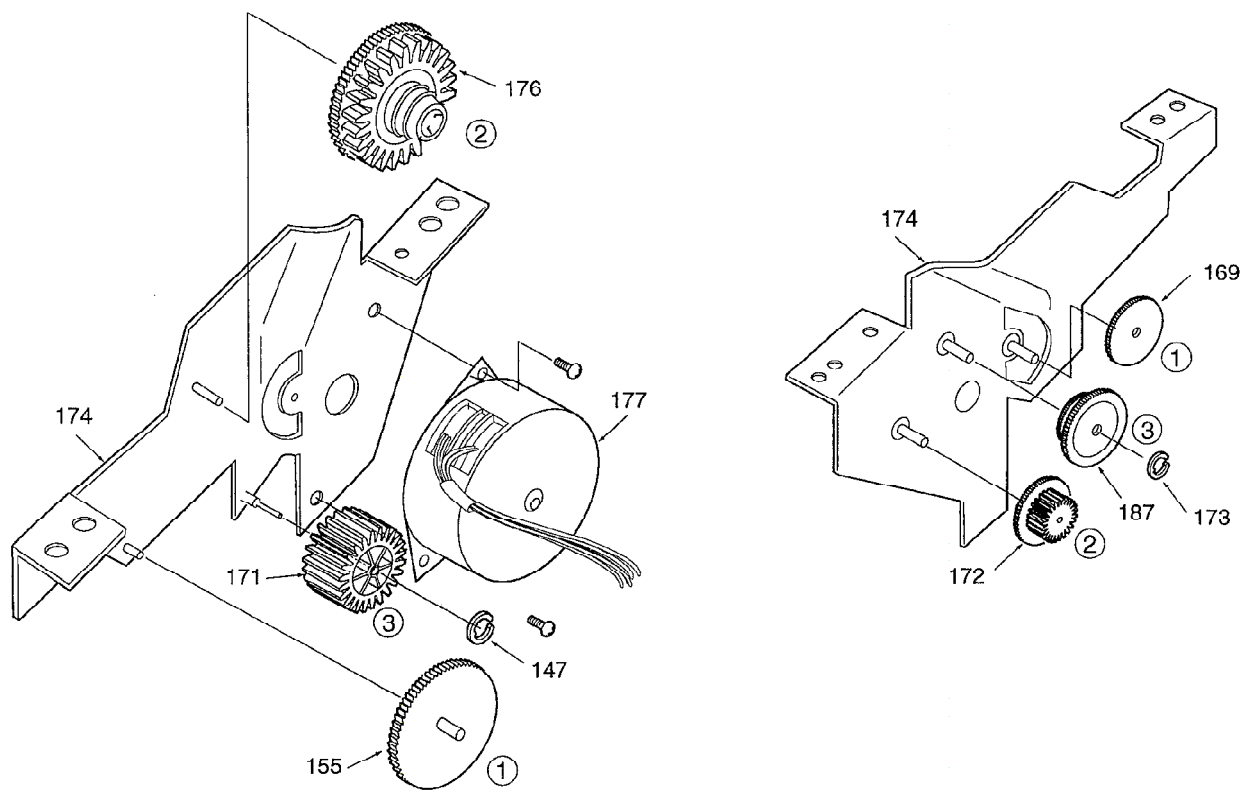
4. MECHANICAL SECTION



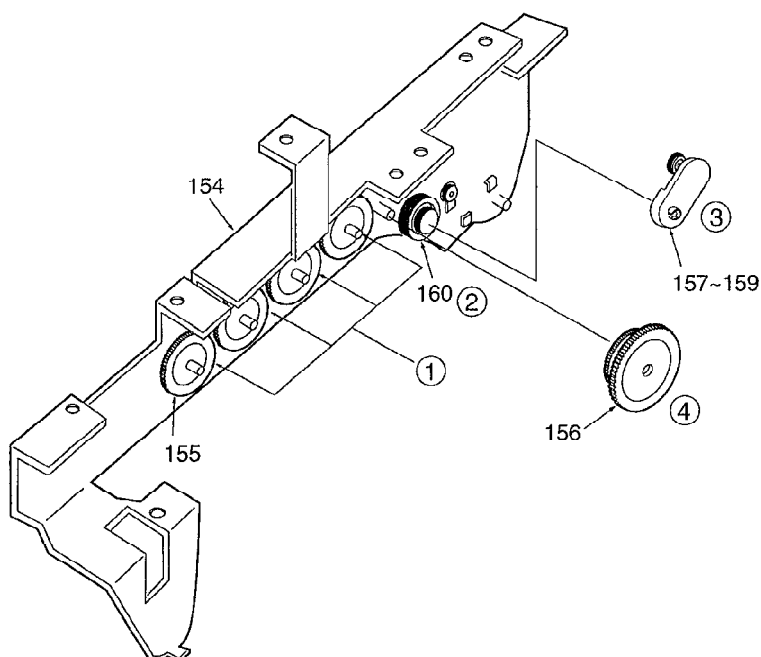
•HOW TO ATTACH THE GEARS

Attach the gears in the order as shown below.

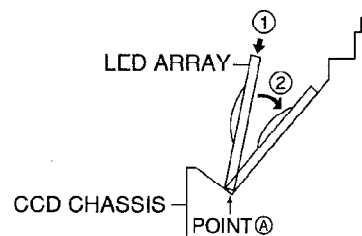
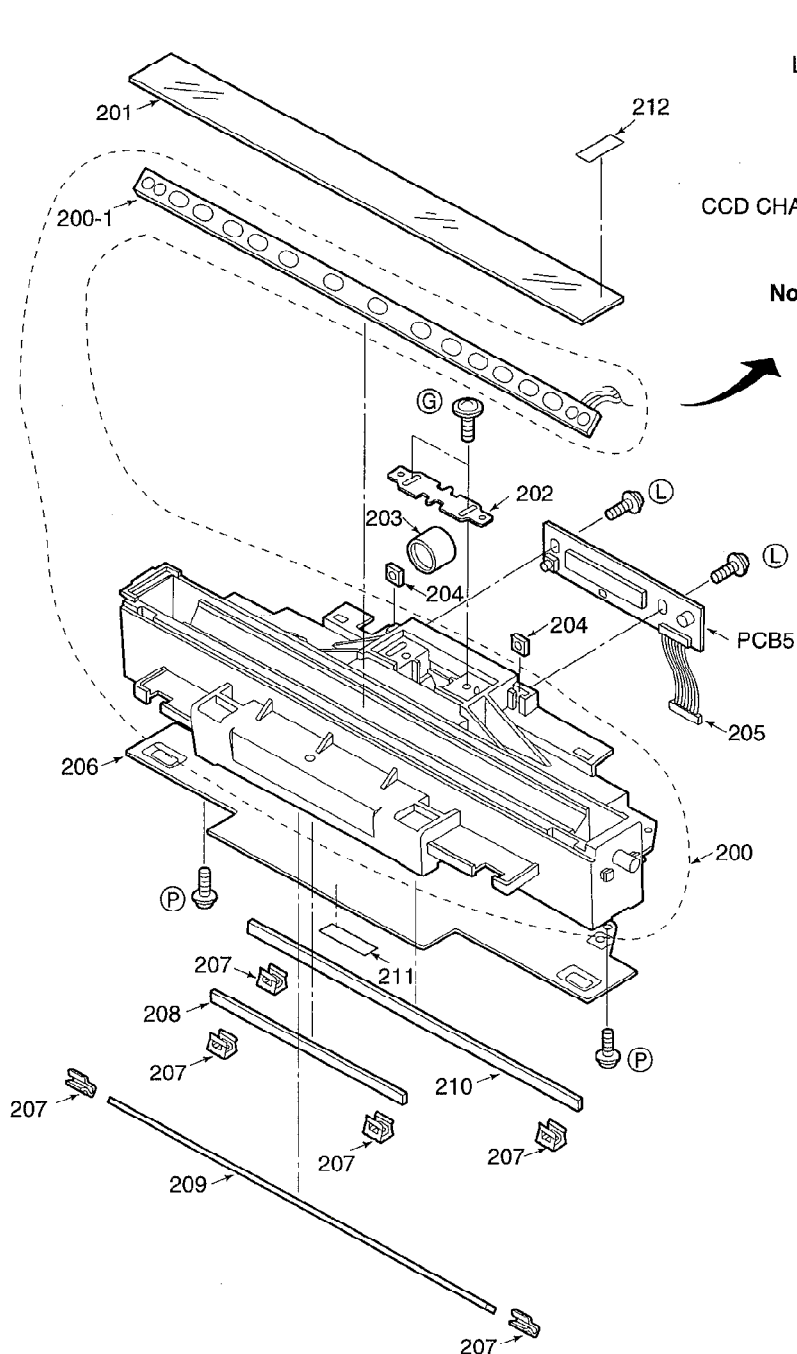
(RX GEARS)



(TX GEARS)








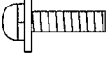





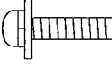





5. CCD UNIT SECTION



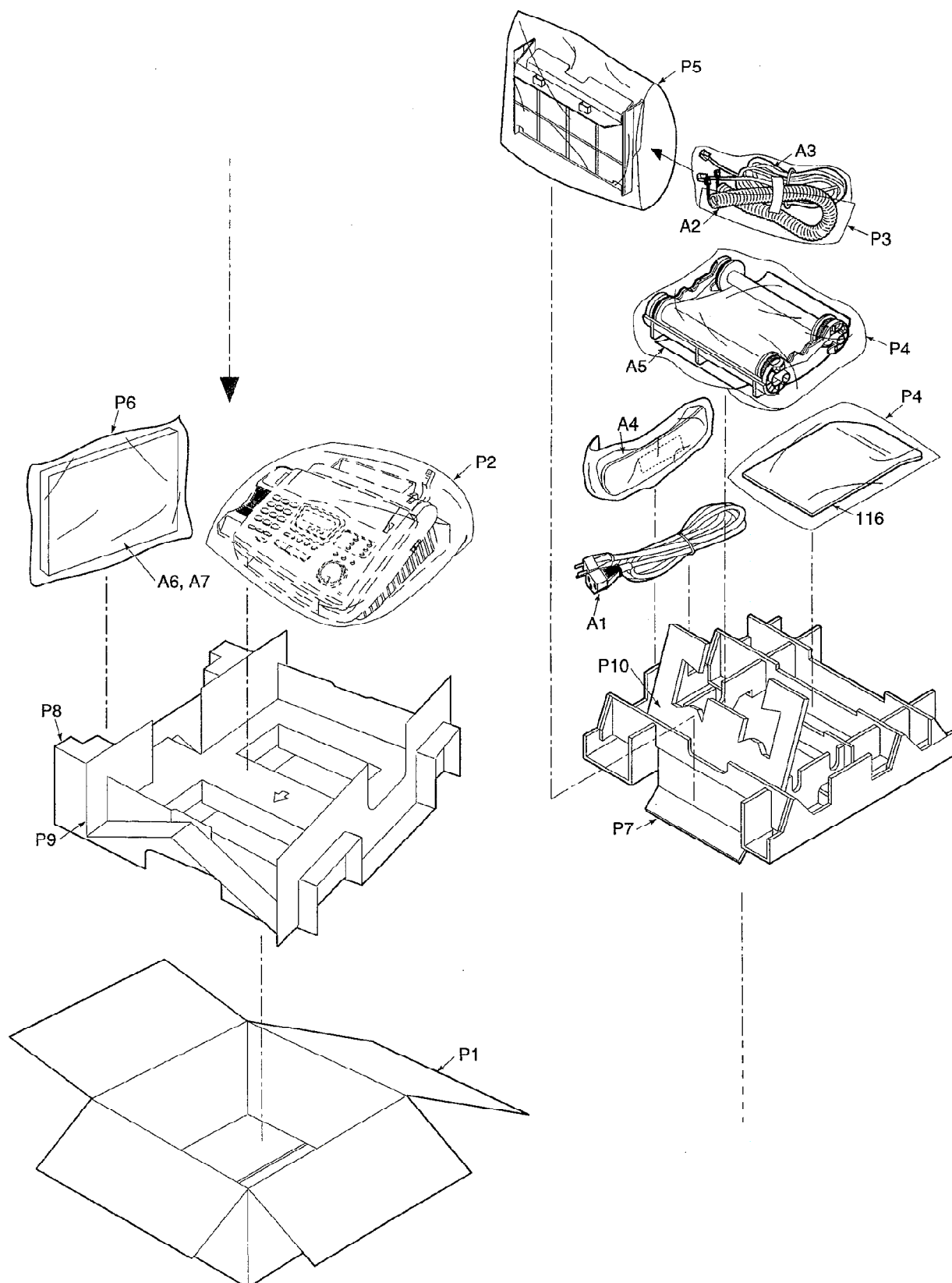
Note: Place the LED Array in the center of point A as shown above.

6. ACTUAL SIZE OF SCREWS AND WASHER

Ref. No.	Part No.	Figure	Ref. No.	Part No.	Figure
Ⓐ	XYN3+F8		Ⓘ	XTW3+W6P	
Ⓑ	XTW3+S6PR		⓵	XTW3+6L	
Ⓒ	XTW3+S8PFZ		Ⓚ	XTW3+U6L	
Ⓓ	XTW3+U6LFZ		Ⓛ	XYN3+F10	
Ⓔ	XTW3+U6L		Ⓜ	XSB4+6	
Ⓕ	XTW3+W8P		Ⓝ	XWC4B	
Ⓖ	XTW3+S10P		Ⓛ	XYN3+F12	
Ⓗ	XTW3+5LR		Ⓟ	XTB3+10G	
			Ⓠ	XTW3+S12P	

KX-FP270

ACCESSORIES AND PACKING MATERIALS



REPLACEMENT PARTS LIST

This replacement parts list is for KX-FP270 only.

Refer to the simplified manual (cover) for other areas.

Model KX-FP270				Ref. No.	Part No.	Part Name & Description	Pcs
Notes:				22	PFQT1451Z	INDICATION LABEL	1
1. The marking (RTL) indicates that the Retention Time is limited for this item.				23	PFGG1025X1	OPERATION PANEL GRILLE	S 1
After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing part and product retention. After the end of this period, the assembly will no longer be available.				24	PFGP1102Z	LCD PANEL	1
2. Important safety notice.				25	PFGD1035Z	TEL. NO. CARD	1
Components identified by Δ mark have special characteristics important for safety.				26	PFGV1004Z	TRANSPARENT PLATE	1
When replacing any of these components, use only manufacturer's specified parts.				27	PQQT11004Z	INDICATION LABEL	1
3. The S mark indicates service standard parts and may differ from production parts.				28	PFGP1091Z	LED COVER	1
4. RESISTORS & CAPACITORS				29	PQJM128Z	MICROPHONE	1
Unless otherwise specified.				30	PFJS02Q09Z	CONNECTOR, 2 PIN	1
All resistors are in ohms (Ω) k=1000 Ω , M=1000k Ω				31	PFGP1090Z	LED COVER	1
All capacitors are in MICRO FARADS (μ F) P= μ F				32	PFKR1010Z2	DOCUMENT GUIDE-L	1
*Type & Wattage of Resistor				33	PFKR1011Z2	DOCUMENT GUIDE-R	1
Type				34	PFUS1034Z	SPRING	1
ERC:Solid	ERX:Metal Film	PQRD:Carbon		35	PFDG1002Z	GEAR	1
ERD:Carbon	ERG:Metal Oxide	PQRQ:Fuse		36	PFBX1041Z1	BUTTON, DIAL	1
PQ4R:Chip	ERO:Metal Film	ERF:Wire Wound		37	PFBX1021Z1	BUTTON, HELP	1
Wattage				38	PFBX1040Y1	BUTTON, STOP	1
10,16,18:1/8W	14,25,S2:1/4W	12,50,S1:1/2W	1:1W 2:2W 5:5W	39	PFBX1043Z1	BUTTON, ONE TOUCH	1
ECFD:Semi-Conductor				40	PFBX1020Z1	BUTTON, START	1
EQQS:Styrol				41	PFBX1044Z1	BUTTON, FAX SAVE	1
PQCBX,ECUV:Chip				42	PFVJS10401	LIQUID CRYSTAL DISPLAY	S 1
ECMS:Mica				43	PFDE1037Z	LEVER, LOCK-L	1
Voltage				44	PFD1016Z	SHAFT, LOCK	1
ECQ Type	ECQG	ECSZ Type	Others	45	PFDE1067Z	LEVER, LOCK-R	1
1H: 50V	05: 50V	0F:3.15V	0J :6.3V 1V :35V	46	PFUS1080Z	SPRING, LOCK LEVER	1
2A:100V	1:100V	1A:10V	1A :10V 50,1H:50V	47	PFDE1069Z	LEVER, DOCUMENT DETECTION	1
2E:250V	2:200V	1V:35V	1C :16V 1J :63V	48	PFUS1027Z	SPRING, DOCUMENT LEVER	1
2H:500V		0J:6.3V	1E,25:25V 2A :100V	49	PFDE1020Z	LEVER, READ DETECTION	1
Ref. No.	Part No.	Part Name & Description	Pcs	50	PFJS11Q06Z	CONNECTOR, 11 PIN	1
CABINET AND ELECTRICAL PARTS				51	PFUV1014Y	COVER, OPERATION PANEL	S 1
1	PFYEFP200M	PAPER TRAY ASS'Y	1	52	PFHR1019Z	LEVER, SEP. SPRING ADJUST	1
1-1	PFYE2FP200M	SUB PAPER TRAY ASS'Y	1	53	PFUS1121Z	SPRING, DOCUMENT FEED	1
1-2	PFKS1013Z1	TRAY	S 1	54	PFUS1026Y	SPRING, SUPPORT ROLLER	1
2	PFMD1026Z	COVER, PAPER CASSETTE	1	55	PQDR10005Y	ROLLER	1
3	PFHG1032Z	RUBBER PARTS, CASSETTE SEP.	1	56	PFHX1081Z	COVER, READING SHEET	1
4	PFUS1087Z	SPRING, CASSETTE TRAY	1	57	PFUS1082Z	SPRING, DOCUMENT FEED	1
5	PFDE1041Z3	LEVER, CASSETTE LOCK	S 1	58	PFHR1081Z	GUIDE, SEPARATION RUBBER	1
6	PFPE1031Z	INK FILM (20m)	S 1	59	PFHG1020Z	RUBBER PARTS, SEPARATION	1
7	PFKS1011X1	PAPER CASSETTE	S 1	60	PFHX1199Z	COVER, JOG SHEET	1
8	PFDG1034Z	GEAR, GEAR	2	61	PFZU2FP200M	RIBBON GUIDE ASS'Y	1
9	PFQT1258Y	INDICATION LABEL	1	61-1	PFHX1115Z	PLASTIC, RIBBON GUIDE	1
10	PFKK1004Z	AHUTTER	1	62	PFDE1043Y	LEVER, OPEN SENSOR	S 1
11	PFHR1043Z1	RIBBON CASSETTE	S 1	63	PFKR1009Z1	CABINET, OPE. SUB COVER	S 1
12	PFDG1038Z1	GEAR	1	64	PFDE1034Y	GUIDE, HEAD HOLDER	1
13	PFDG1037Z	GEAR	3	65	PFMH1038Z	ANGLE, HEAD FULCRUM	1
14	PFQT1221Z	INDICATION LABEL	1	66	PFUS1083Z	SPRING, THERMAL HEAD	2
		(2.OPERATION PANEL SECTION)		67	PFDE1035Y	GUIDE, HEAD HOLDER	1
20	PFBE1002Z4	BUTTON, JOG DIAL	1	68	PFJS12Q03Z	CONNECTOR, 12 PIN	1
21	PFKS1018Z1	DOCUMENT TRAY	1	69	PFJHS013Z	THERMAL HEAD	S 1
				70	PFUS1025Z	SPRING, ROLLER	2
				71	PFD1005Z	SHAFT, SUPORT ROLLER	S 1
				72	PQDR9685Y	ROLLER, SUPPORT	S 1
				73	PFHR1047Y	ARM, DUMPER	1
				74	PFHE1004Z	NUT,STEEL	2
				75	PFUS1088Z	SPRING, THERMAL HEAD	1
				76	PFUS1109Z	SPRING, DOCUMENT LEVER	1
				77	PFHX1212Z	JOG DIAL SHEET	1

KX-FP270

This replacement parts list is for KX-FP270 only.				Refer to the simplified manual (cover) for other areas.			
Ref. No.	Part No.	Part Name & Description	Pcs	Ref. No.	Part No.	Part Name & Description	Pcs
		(3. UPPER CABINET/P.C.B. SECTION)		152	PF0G1036Z	GEAR, ENCORDER	1
				153	PFUS1065Z	SPRING, BACK TENSION	1
90	PFKM1014Y1	CABINET COVER, H/S CRADLE	S 1	154	PFUA1009Y	CHASSIS, TX GEAR	1
91	PFBH1004Y1	BUTTON, HOOK	S 1	155	PF0G1032Y	GEAR, IDLER	5
92	PFJS03Q05Z	CONNECTOR, 3 PIN	1	156	PF0G1033Y	GEAR, IDLER	1
93	PQAS5P13Y	SPEAKER	1	157	PFUS1019Z	SPRING, THRUST	1
94	PFJS02R54Z	CONNECTOR, 2 PIN	1	158	PF0G1005Z	GEAR, CHANGEOVER	1
95	PFKM1015Z1	CABINET BASE, H/S CRADLE	S 1	159	PFDE1014Z	ARM, CHANGEOVER	1
96	PFKF1024W1	CABINET, BASE	S 1				
97	PFZEP250M	P. SEPARATION HOLDER ASS'Y	1	160	PF0G1009Z	GEAR, IDLER	1
97-1	PFHG1045Z	RUBBER, PAPER SEPARATION	1	161	PF0G1008Z	GEAR, IDLER	1
97-2	PFHX1114Z	SEPARATION SHEET	1	162	PFUS1017Y	SPRING, STATIC ELECTRIC	1
98	PFJS03R52Z	CONNECTOR, 3 PIN	1	163	PF0G1007Z	GEAR, IDLER	1
99	PFDE1042Z	LEVER, PAPER LOCK SENSOR	1	164	PFMD1016Y	COVER, MAIN	S 1
				165	PF0G1004Z	ROLLER, SEPARATION	1
100	PFUS1068Z	SPRING, P. SEPARATION	1	166	PQUS10055Z	SPRING, ONE WAY	1
101	Not Used			167	PF0G1012Z	GEAR, SEPARATION ROLLER	1
102	PQDE10055Z	LEVER, PAPER TOP SENSOR	1	168	PFJQ1011Z	TX MOTOR	1
103	PFUS1076Z	SPRING, PAPER TOP	1	169	PF0G1031Y	GEAR, IDLER	1
104	PQLB1E1	FERRITE CORE	S 1				
105	PQJP03S07Z	CONNECTOR, 3 PIN	Δ 1	170	PFUS1018X	SPRING, STATIC ELECTRIC	1
106	PQJS02Q59Y	CONNECTOR, 2 PIN	1	171	PF0G1039Y	GEAR, RIBBON DRIVE	S 1
107	PFMD1017Y	COVER, BASE	1	172	PF0G1076Z	GEAR, IDLER	1
108	PFGT1352Z	NAME PLATE,AL	1	173	PF0G1075Z	GEAR, IDLER	1
109	PQHM112Z	CLAMPER	1	174	PFUA1013Z	CHASSIS, RX GEAR	1
				175	PFDF1019Y	SHAFT, PARALELL PIN	1
110	PFHA1001Z	RUBBER PARTS, LEG	S 4	176	PFDX1008Z	GEAR, WIND TORQUE LIMITER	1
111	PQHM171Z	DOOR-LID, ROM COVER	1	177	PFJQ1010Z	RX MOTOR	1
112	PFUS1086Z	SPRING, PAPER SEPARATION	1	178	PFDR1008Z	ROLLER, DUMPER	1
113	PFHX1142Z	RIBBON GUIDE SHAFT SHEET	1	179	PFJS03R57Z	CONNECTOR, 3 PIN	1
114	PFJS09Q04Z	CONNECTOR, 9 PIN	1				
115	PFNW1002Z	WASHER	1	180	PFUS1071Z	SPRING, OPEN BUTTON	1
116	PFZE1FP250M	DOCUMENT TRAY ASS'Y	1	181	PFHR1048Z	ARM, STOPPER	1
116-1	PFKS1020Z1	DOCUMENT TRAY	1	182	PFJS06Q01Z	CONNECTOR, 6 PIN	1
116-2	PFKS1021Z1	SUB DOCUMENT TRAY	1	183	PFJS09R56Z	CONNECTOR, 9 PIN	1
117	PFHX1171Z	VIBRATION SHEET	4	184	PFHX1139Z	COVER, ROLLING SHEET	1
118	PFHX1148Z	VIBRATION SHEET	1	185	PFHR1044Z	GUIDE, DUMPER HOLDER	1
119	PFHX1170Z	VIBRATION SHEET	1	186	PFYTFP200M	OPEN BUTTON ASS'Y	1
120	PFUS1081X,	SPRING, RX EARTH	1	187	PQFN51Z	WASHER	1
		(4. MECHANICAL SECTION)		188	PF0G1029Y	GEAR, RIBBON DRIVE	S 1
				189	PFQT1221Z	INDICATION I ARFI	1
130	PFDF1018Z	SHAFT, RIBON GUIDE	1	190	PFHX1171Z	COVER, VIBRATION SHEET	2
131	PF0G1027Y	GEAR, PLATEN DRIVE	1				
132	PF0J1011Z	SPACER, PLATEN	2				
133	PF0N1010Z	ROLLER, PLATEN	1				
134	PF0J1007Z	SPACER, ROLLER	2				
135	PF0N1006Z	ROLLER, DOCUMENT FEED	1				
136	PF0G1004Z	GEAR, DOCUMENT FEED	1				
137	PFUS1073Z	SPRING, POP UP	2			(5. CCD UNIT SECTION)	
138	PF0J1006Z	SPACER, ROLLER	2	200	PFWLF780M	CHASSIS ASS'Y	1
139	PF0N1005Z	ROLLER, DOCUMENT FEED	1	200-1	PFVDSLA30222	LED ARRAY	1
				201	PF0G1001Z	TARGET GLASS	1
140	PF0G1003Z	GEAR, DOCUMENT FEED ROLLER	1	202	PFUS1021Z	SPRING	1
141	PFKM1033Z1	CABINET, MAIN	S 1	203	PF0L1001Z	LENS	1
142	PF0N1011Z	ROLLER, PICK UP	1	204	PFHE1004Z	NUT	2
143	PQDJ10002Z	SPACER, ROLLER	4	205	PFJS08R58Z	CONNECTOR, 8P	1
144	PFUS1067Z	SPRING, CLUTCH	1	206	PFMD1007Z	COVER	1
145	PF0G1074Z	GEAR, PICK UP ROLLER	1	207	PFUS1028Z	SPRING	6
146	PFUS1122Z	SPRING, EARTH	1	208	PF0M1003Z	MIRROR, SMALL	1
147	XUC2FY	RETAINING RING	4	209	PF0M1001Z	MIRROR, LARGE	1
148	PQHM112Z	CLAMPER	1	210	PF0M1002Z	MIRROR, MIDDLE	1
149	PFNW1003Z	WASHER	2	211	PFHX1141Z	SHEET	1
				212	PFHX1215Z	SHEET	1
150	PFHG1030Z	RUBBER PARTS	1				
151	XWE5VW	WASHER	1				

This replacement parts list is for KX-FP270 only. Refer to the simplified manual (cover) for other areas.

Ref. No.	Part No.	Part Name & Description	Pcs	Ref. No.	Part No.	Part Name & Description	Pcs
ACCESSORIES AND PACKING MATERIALS				Q516	2SD1819A	TRANSISTOR(SI) [OR 2SC4155 OR 2SC4081]	1
A1	PQJA200Z	POWER CORD	1	IC508	PFVTSI4431DY	TRANSISTOR(SI)	1
A2	PQJA212M	HANDSET CORD	1				
A3	PQJA59V	TELEPHONE CORD	1			(DIODES)	
A4	PFJXE0105Z	HANDSET ASS'Y	1			DIODE(SI)	1
A5	PTQW1246Z	LEAFLET	1	D508	RI S71	DIODE(SI)	1
A6	PFQX1197Z	INSTRUCTION BOOK	1	DA501	MA141WK	DIODE(SI)	1
A7	PFQV1036Z	ADVANTAGE PROGRAM SHEET	1				
P1	PFPK1366Z	GIFT BOX	1			(BATTERY)	
P2	PFPH1008Z	PACKING SHEET	1	BAT501	PQPCR2032H09	BATTERY	1
P3	XZB20X20A04	BAG,POLYETHYLENE	1				
P4	XZB21X43A04	BAG,POLYETHYLENE	2			(CONNECTORS)	
P5	XZB20X35A04	BAG,POLYETHYLENE	1	CN501	PQJP12A19Z	CONNECTOR, 12 PIN	1
P6	XZB32X45A04	BAG,POLYETHYLENE	1	CN502	PQJP12A19Z	CONNECTOR, 12 PIN	1
P7	PFPN1116Z	CUSHION, UPPER	1	CN503	PQJP07A19Z	CONNECTOR, 7 PIN	1
P8	PFPN1114Z	CUSHION	1	CN504	PQJP03G100Z	CONNECTOR, 3 PIN	1
P9	PFPN1115Z	CUSHION	1	CN505	PQJP3G30Y	CONNECTOR, 3 PIN	1
P10	PFPE1041Z	CUSHION, STOPPER	1	CN506	PQJP8G30Y	CONNECTOR, 8 PIN	1
DIGITAL BOARD PARTS				CN507	PQJP11G30Y	CONNECTOR, 11 PIN	1
PCB1	PFWP1FP270M	DIGITAL BOARD ASS'Y (RTL)	1	CN508	PQJP12G30Y	CONNECTOR, 12 PIN	1
		(ICs)					
IC501	PFVIM66395M1	IC	1	CN510	PQJP9G30Y	CONNECTOR, 9 PIN	1
IC502	PFWIFP270M	IC (ROM)	1	CN511	PQJP06G100	CONNECTOR, 6 PIN	1
IC503	PFVIM4480CF	IC	1	CN512	PQJP09G100Z	CONNECTOR, 9 PIN	1
IC504	PFVIM6256FF	IC	1				
IC505	PFVIR667555	IC	1			(COILS)	
IC509	PFVIS80842AN	IC	1	L509~520	PQLQR1RM601	COIL	12
IC510	PFVIMC78M05C	IC	1	L522	PQLQR1ET	COIL	1
IC511	PFVIMC78M05C	IC	1	L523	PQLQR1RM601	COIL	1
IC513	PFVIMK29N04T	IC	1	L524	PQLQR1ET	COIL	1
IC514	PFVIR10485	IC	1	L525	PQLQR2N2R7K	COIL	1
IC515	PQVINJM4558M	IC	1	R519	PQLQR1RM601	COIL	1
IC516	PQVINJM4558M	IC	1				
		(TRANSISTORS)		RA501~	EXRV8V271JV	(COMPONENTS PARTS)	
Q503	PQVTDTC114EU	TRANSISTOR(SI) [OR UN5211]	1	RA504		COMPONENTS PARTS	1
Q505	PQVTDTC114EU	TRANSISTOR(SI) [OR UN5211]	1	RA505~	EXRV8V101JV	COMPONENTS PARTS	1
Q506	2SD1819A	TRANSISTOR(SI) [OR 2SC4155 OR 2SC4081]	1	RA508			
Q507	2SB1197K	TRANSISTOR(SI) [OR 2SB1051K]	1			(CERAMIC FILTERS)	
Q508	2SD1819A	TRANSISTOR(SI) [OR 2SC4155 OR 2SC4081]	1	LF501	EXCEMT222D	CERAMIC FILTER	1
Q509	2SB1197K	TRANSISTOR(SI) [OR 2SB1051K]	1				
Q510~512	2SD1819A	TRANSISTOR(SI) [OR 2SC4155 OR 2SC4081]	3	F501	XBAPF001312	(FUSE) FUSE	1
Q513	2SB709A	TRANSISTOR(SI) [OR 2SB1051K OR 2SB1197K]	1			(CRYSTAL OSCILLATORS)	
Q514	2SB709A	TRANSISTOR(SI) [OR 2SB1051K OR 2SB1197K]	1	X501	PFVCCFS32Z	CRYSTAL OSCILLATOR	1
Q515	2SD1819A	TRANSISTOR(SI)	1	X502	PFVCCSA24Z	CRYSTAL OSCILLATOR	1
				X503	PFVC5376Z	CRYSTAL OSCILLATOR	1

KX-FP270

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Ref. No.	Part No.	Value	Pcs	Ref. No.	Part No.	Value	Pcs
		(RESISTORS)					
L521	ERJ3GEY0R00	0	1	R579	ERJ3GEYJ821	820	1
R505	ERJ3GEYJ101	100	1	R580	ERJ3GEYJ103	10K	1
R506	ERJ3GEYJ101	100	1	R581	ERJ3GEYJ472	4.7K	1
R507	ERJ3GEYJ101	100	1	R582	ERJ3GEYJ912	9.1K	1
R508	ERJ3GEYJ271	270	1	R583	ERJ3GEYJ223	22K	1
R509	ERJ3GEYJ101	100	1	R584	ERJ3GEYJ104	100K	1
				R585	ERJ3GEYJ104	100K	1
R510	ERJ3GEYJ101	100	1	R586	ERJ3GEYJ563	56K	1
R511	ERJ3GEYJ223	22K	1	R587	ERJ3GEYJ104	100K	1
R512	ERJ3GEYJ823	82K	1	R588	ERJ3GEYJ472	4.7K	1
R515	ERJ3GEYJ102	1K	1	R589	ERJ3GEYJ103	10K	1
R516	ERJ3GEYJ102	1K	1				
R517	ERJ3GEYJ101	100	1	R590	ERJ3GEYJ331	330	1
R518	ERJ3GEYJ101	100	1	R591	ERJ3GEYJ103	10K	1
				R592	ERJ3GEYJ103	10K	1
R520	ERJ3GEYJ101	100	1	R593	ERJ3GEYJ103	10K	1
R521	ERJ3GEYJ101	100	1	R594	ERJ3GEYJ331	330	1
R522	ERJ3GEYJ101	100	1	R595	ERJ3GEYJ563	56K	1
R525	ERJ3GEYJ562	5.6K	1	R596	ERJ3GEYJ562	5.6K	1
R526	ERJ3GEYJ472	4.7K	1	R597	PQ4R10XJ270	27	S 1
R527	ERJ3GEYJ203	20K	1	R598	PQ4R10XJ330	33	S 1
				R599	ERJ3GEYJ101	100	1
R532	ERJ3GEYJ473	47K	1				
R534	ERJ3GEYJ473	47K	1	R600	ERJ3GEYJ103	10K	1
R535	ERJ3GEY0R00	0	1	R601	ERJ3GEYJ563	56K	1
R537	ERJ3GEYJ103	10K	1	R602	ERJ3GEYJ563	56K	1
R539	ERJ3GEYJ472	4.7K	1	R603	ERJ3GEYJ332	3.3K	1
				R604	ERJ3GEYJ103	10K	1
R540	ERJ3GEY0R00	0	1	R605	ERJ3GEYJ103	10K	1
R541	ERJ3GEYJ153	15K	1	R606	ERJ3GEYJ472	4.7K	1
R542	ERJ3GEYJ103	10K	1	R607	ERJ3GEYJ103	10K	1
R543	ERJ3GEY0R00	0	1	R608	ERJ3GEYJ103	10K	1
R544	ERJ3GEYJ472	4.7K	1	R609	ERJ3GEYJ393	39K	1
R545	ERJ3GEY0R00	0	1				
R547	ERJ3GEYJ271	270	1	R610	ERJ3GEYJ393	39K	1
R548	ERJ3GEYJ271	270	1	R611	PQ4R18XJ150	15	1
R549	ERJ3GEYJ271	270	1	R612	ERJ3GEYJ393	39K	1
				R613	ERJ3GEYJ393	39K	1
R550	ERJ3GEY0R00	0	1	R614	ERJ3GEYJ683	68K	1
R551	ERJ3GEYJ101	100	1	R615	ERJ3GEYJ103	10K	1
R552	ERJ3GEYJ472	4.7K	1	R616	ERJ3GEY0R00	0	1
R553	ERJ3GEYJ101	100	1	R617	ERJ3GEYJ683	68K	1
R555	ERJ3GEYJ101	100	1	R618	ERJ3GEYJ103	10K	1
R556	ERJ3GEYJ101	100	1	R619	ERJ3GEYJ472	4.7K	1
R557	ERJ3GEY0R00	0	1				
R558	ERJ3GEYJ472	4.7K	1	R620	ERJ3GEYJ103	10K	1
R559	ERJ3GEY0R00	0	1	R621	ERJ3GEYJ101	100	1
				R622	ERJ3GEYJ101	100	1
R560	ERJ3GEY0R00	0	1	R623	ERJ3GEYJ333	33K	1
R561	ERJ3GEYJ101	100	1	R624	ERJ3GEYJ472	4.7K	1
R562	ERJ3GEYJ101	100	1	R626	ERJ3GEYJ103	10K	1
R563	ERJ3GEYJ103	10K	1	R627	ERJ3GEYJ103	10K	1
R566	ERJ3GEYJ101	100	1	R628	ERJ3GEYJ101	100	1
R567	ERJ3GEYJ101	100	1	R629	ERJ3GEY0R00	0	1
R568	ERJ3GEYJ101	100	1				
				R630	ERJ3GEYJ271	270	1
R570	ERJ3GEYJ101	100	1	R631	ERJ3GEYJ271	270	1
R571	ERJ3GEYJ270	27	1	R632	ERJ3GEYJ271	270	1
R572	ERJ3GEYJ105	1M	1	R633	ERJ3GEYJ271	270	1
R574	ERJ3GEYJ222	2.2K	1	R634	ERJ3GEYJ271	270	1
R575	ERJ3GEYJ122	1.2K	1	R635	ERJ3GEYJ271	270	1
R576	ERJ3GEYJ221	220	1	R636	ERJ3GEYJ101	100	1
R577	ERJ3GEYJ472	4.7K	1	R638	ERJ3GEYJ184	180K	1
R578	ERJ3GEYJ122	1.2K	1				

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Ref. No.	Part No.	Value	Pcs	Ref. No.	Part No.	Value	Pcs
R642	ERJ3GEY0R00	0	1	C567	ECUV1H120JCV	12P	1
R643	ERJ3GEYJ103	10K	1	C568	ECUV1H104ZFV	0.1	S 1
R644	PQ1R18XJ102	1K	1	C569	ECUV1H330JCV	33P	1
R645	ERJ3GEYJ103	10K	1				
R646	ERJ3GEYJ103	10K	1	C570	ECUV1H104ZFV	0.1	S 1
R647	ERJ3GEYJ103	10K	1	C571	ECUV1C224ZFV	0.22	1
				C572	ECUV1C224ZFV	0.22	1
				C573	ECUV1C224ZFV	0.22	1
				C574	ECUV1C224ZFV	0.22	1
				C576	ECUV1H104ZFV	0.1	S 1
				C578	ECUV1H333KDV	0.033	S 1
				C579	ECUV1H104ZFV	0.1	S 1
				C580	ECUV1H104ZFV	0.1	S 1
				C581	ECUV1H472KBV	0.0047	S 1
				C582	ECUV1H472KBV	0.0047	S 1
				C583	PQCUV1H105JC	1	S 1
				C584	PQCUV1H105JC	1	S 1
				C585	ECA1CM100	10	1
				C586	ECA1CM100	10	1
				C587	ECA0JM221	220	1
				C588	ECA0JM101	100	1
				C589	ECUV1H104ZFV	0.1	S 1
				C590	ECUV1H333KDV	0.033	S 1
				C591	ECA0JM221	220	1
				C592	ECUV1H104ZFV	0.1	S 1
				C593	ECUV1H104ZFV	0.1	S 1
				C594	ECUV1H104ZFV	0.1	S 1
				C595	ECUV1H030CCV	3P	S 1
				C596	ECA1VM470	47	1
				C597	ECUV1H080DCV	8P	1
				C598	ECUV1H102JCV	0.001	1
				C600	PQCUV1C224KB	0.22	S 1
				C601	PQCUV1C224KB	0.22	S 1
				C602	PQCUV1C224KB	0.22	S 1
				C603	PQCUV1H105JC	1	S 1
				C605	PQCUV1C224KB	0.22	S 1
				C606	PQCUV1C224KB	0.22	S 1
				C607	PQCUV1H104ZF	0.1	1
				C608	ECUV1H331JCV	330P	S 1
				C609	ECUV1E273KBV	0.027	1
				C611	ECUV1C104KBV	0.1	1
				C612	ECUV1H1047FV	0.1	S 1
				C614	ECUV1H104ZFV	0.1	S 1
				C615	ECUV1C104KBV	0.1	1
				C618	ECUV1H102JCV	0.001	1
				C619	ECA0JM221	220	1
				C622	ECUV1H104ZFV	0.1	S 1
				C623	PQCUV1H105JC	1	S 1
				C624	PQCUV1H105JC	1	S 1
				C625	ECA1CM100	10	1
				C626	ECA1CM100	10	1
				C627	ECUV1H104ZFV	0.1	S 1
				C628	ECUV1H104ZFV	0.1	S 1
				C629	ECUV1H120JCV	12P	1
				C632	ECUV1H104MD	0.1	S 1
C503	ECUV1H561JCV	560P	1				
C507	PQCUV1H473MD	0.047	1				
		(CAPACITORS)					
C510	ECUV1H222KBV	0.0022	1				
C512	ECUV1C104KBV	0.1	1				
C513	ECUV1H104ZFV	0.1	S 1				
C515	ECUV1H102KBV	0.001	1				
C516	ECUV1H102KBV	0.001	1				
C521	ECUV1H102JCV	0.001	1				
C522	ECUV1H104ZFV	0.1	S 1				
C523	ECUV1H104ZFV	0.1	S 1				
C524	ECUV1H104ZFV	0.1	S 1				
C525	ECUV1C224ZFV	0.22	1				
C526	ECUV1H104ZFV	0.1	S 1				
C527	ECUV1H104ZFV	0.1	S 1				
C528	ECUV1H104ZFV	0.1	S 1				
C529	ECUV1H104ZFV	0.1	S 1				
C530	ECUV1H120JCV	12P	1				
C532	ECUV1H104ZFV	0.1	S 1				
C533	ECUV1H104ZFV	0.1	S 1				
C534	ECUV1H104ZFV	0.1	S 1				
C535	ECUV1H150JCV	15P	1				
C536	ECA0JM101	100	1				
C537	ECUV1H104ZFV	0.1	S 1				
C538	ECUV1H104ZFV	0.1	S 1				
C543	ECUV1H104ZFV	0.1	S 1				
C544	ECUV1H104ZFV	0.1	S 1				
C545	ECUV1H104ZFV	0.1	S 1				
C546	ECUV1H104ZFV	0.1	S 1				
C547	ECUV1H104ZFV	0.1	S 1				
C548	ECUV1H104ZFV	0.1	S 1				
C549	ECA0JM101	100	1				
C550	ECUV1H104ZFV	0.1	S 1				
C551	ECUV1H104ZFV	0.1	S 1				
C552	ECUV1H104ZFV	0.1	S 1				
C553	ECUV1H104ZFV	0.1	S 1				
C554	ECUV1C104KBV	0.1	1				
C556	ECUV1H104ZFV	0.1	S 1				
C562	ECUV1H120JCV	12P	1				
C565	ECUV1H120JCV	12P	1				
C566	ECUV1H080DCV	8P	1				

KX-FP270

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Ref. No.	Part No.	Part Name & Description	Pcs	Ref. No.	Part No.	Part Name & Description & Value	Pcs
ANALOG BOARD PARTS							
PCB2	PFLP1141MZ	ANALOG BOARD ASS'Y (RTL) Δ	1	L101~104	PQLQR1RM601	(COILS) COIL	4
IC101	PQVITC4066BF	IC	1	L105	PQLQR1E32A07	COIL	1
IC102	PQVINJM2113M	IC	1	L106	PQLQR1E32A07	COIL	1
IC103	AN6382NFA	IC	1	L108~111	PQLQR2KA113T	COIL	4
IC104	PFVINJM4558M	IC	1	FLT101	PFLE003	COIL	1
IC105	PQVIMT3274AE	IC	1	PC101	0N3131SKU	(PHOTO COUPLERS) PHOTO ELECTRIC TRANSDUCER	Δ 1
				PC102	0N3131SKU	PHOTO ELECTRIC TRANSDUCER	Δ 1
				PC103	PQVITLP627	PHOTO ELECTRIC TRANSDUCER	Δ 1
				PC104	PQVIPC814K	PHOTO ELECTRIC TRANSDUCER	Δ 1
		(TRANSISTORS)					
Q105	2SC2235	TRANSISTOR(SI)	1			(TRANSFORMERS)	
Q106	2SD2136	TRANSISTOR(SI)	1	T101	PQLT8E7A	TRANSFORMER	Δ 1
Q107	2SD1819A	TRANSISTOR(SI) [OR 2SC4155 OR 2SC4081]	1	T102	PQLT8E6A	TRANSFORMER	Δ 1
Q108	2SD1921Q	TRANSISTOR(SI) [OR 2SD1994A]	1				
Q109	2SA1627	TRANSISTOR(SI)	1			(VARISTORS)	
Q110	PQVTDTC143E	TRANSISTOR(SI) [OR UN521]	1	SA101	PQVDDSS301L	VARISTOR	1
				SA102	PFVDRA102M	VARISTOR	1
		(DIODES)		ZNR101	ERZVA7D121	VARISTOR	1
D104	MA4056	DIODE(SI)	1				
D107	PQVDHZS2B1	DIODE(SI)	1			(COMPONENTS PARTS)	
D108	MA4056	DIODE(SI)	1	L107	EXCELDR35	COMPONENTS PARTS	1
D109	1SS119	DIODE(SI)	1				
D110	1SS119	DIODE(SI)	1			(THERMISTOR)	
D111	1SS119	DIODE(SI)	1	POS101	PFRT002	THERMISTOR	1
D112	1SS119	DIODE(SI)	1				
D114	1SS119	DIODE(SI)	1			(RESISTORS)	
D115	PQVDS1ZB40F1	DIODE(SI)	1	D117	ERDS2TJ560	56	1
D116	1SS119	DIODE(SI)	1	L112	ERJ3GEY0R00	0	1
D118	1SS119	DIODE(SI)	1	L113	ERJ3GEY0R00	0	1
		(CONNECTORS & JACKS)		J1	ERJ3GEY0R00	0	1
CN101	PQJS12A10Z	CONNECTOR, 12 PIN	1	J2	ERJ3GEY0R00	0	1
CN102	PQJS12A10Z	CONNECTOR, 12 PIN	1	JJ115	ERJ3GEY0R00	0	1
CN103	PQJS07A10Z	CONNECTOR, 7 PIN	1	R101	ERJ3GEYJ103	10K	1
CN104	PQJP2G30Z	CONNECTOR, 2 PIN	1	R102	ERJ3GEYJ103	10K	1
CN105	PQJP02G100Z	CONNECTOR, 2 PIN	1	R103	ERJ3GEYJ224	220K	1
CN106	PFJP02A06Z	CONNECTOR, 2 PIN	1	R104	ERJ3GEYJ224	220K	1
CN107	PQJJ1TB18Z	JACK	1	R105	ERJ3GEYJ224	220K	1
CN108	PFJJ1T01Z	JACK	1	R106	ERJ3GEYJ224	220K	1
		(SWITCH)		R107	ERNJ3GEYJ122	1.2K	1
SW101	PFSH1A02Z	SWITCH	1	R108	ERJ3GEYJ472	4.7K	1
				R110	ERJ3GEYJ562	5.6K	1
		(CERAMIC FILTER)		R113	ERJ3GEYJ102	1K	1
X101	PQVBT4.19G2	CERAMIC FILTER	1	R114	ERJ3GEYJ472	4.7K	1
				R116	ERJ3GEYJ153	15K	1
				R123	ERJ3GEYJ103	10K	1
				R125	ERJ3GEYJ103	10K	1
				R129	ERJ3GEY0R00	0	1

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Ref. No.	Part No.	Value	Pcs	Ref. No.	Part No.	Value	Pcs
R134	ERDS2TJ4R7	4.7	1	R203	ERJ3GEYJ104	100K	1
R136	ERJ3GEYJ104	100K	1	R204	ERJ3GEYJ822	8.2K	1
R139	ERJ3GEYJ114	110K	1	R205	ERJ3GEYJ222	2.2K	1
				R206	ERJ3GEYJ222	2.2K	1
R140	ERJ3GEYJ562	5.6K	1	R207	PQ4R10XJ103	10K	S 1
R141	ERJ3GEYJ114	110K	1	R208	ERJ3GEYJ103	10K	1
R142	ERJ3GEYJ103	10K	1	R209	ERJ3GEYJ103	10K	1
R144	ERJ3GEYJ563	56K	1				
R145	ERJ3GEYJ563	56K	1	R210	ERJ3GEYJ103	10K	1
R146	ERJ3GEYJ333	33K	1	R211	ERJ3GEYJ103	10K	1
R147	ERJ3GEYJ333	33K	1	R212	ERDS2TJ472	4.7K	1
R149	ERJ3GEYJ103	10K	1	R213	ERJ3GEYJ103	10K	1
				R214	ERJ3GEYJ104	100K	1
R150	ERJ3GEYJ223	22K	1	R215	ERJ3GEYJ182	1.8K	1
R151	ERJ3GEYJ333	33K	1	R216	ERJ3GEYJ222	2.2K	1
R152	ERJ3GEYJ683	68K	1	R217	ERJ3GEYJ153	15K	1
R156	ERJ3GEYJ124	120K	1	R218	ERJ3GEYJ153	15K	1
R157	ERJ3GEYJ223	22K	1	R219	ERJ3GEYJ100	10	1
R158	ERJ3GEYJ154	150K	1				
R159	ERJ3GEYJ103	10K	1	R220	ERJ3GEYJ103	10K	1
				R221	ERJ3GEYJ152	1.5K	1
R160	ERJ3GEYJ183	18K	1	R222	ERJ3GEYJ472	4.7K	1
R161	ERJ3GEYJ124	120K	1	R223	ERG2SJ681	680	1
R162	ERJ3GEYJ123	12K	1	R224	ERJ3GEYJ471	470	1
R163	ERJ3GEYJ102	1K	1	R225	ERJ3GEYJ152	1.5K	1
R164	ERJ3GEYJ273	27K	1	R226	ERJ3GEYJ223	22K	1
R165	ERJ3GEYJ562	5.6K	1	R227	ERJ3GEYJ101	100	1
R166	ERJ3GEYJ104	100K	1	R228	ERJ3GEYJ102	1K	1
R167	ERJ3GEYJ101	100	1	R229	ERDS1TJ473	47K	S 1
R168	ERJ3GEYJ101	100	1				
R169	ERJ3GEYJ101	100	1	R230	ERJ3GEYJ101	100	1
				R231	ERDS1TJ473	47K	S 1
R170	ERJ3GEYJ472	4.7K	1	R234	ERJ3GEYJ333	33K	1
R171	ERJ3GEYJ223	22K	1	R236	ERJ3GEYJ103	10K	1
R172	ERJ3GEYJ332	3.3K	1	R238	ERJ3GEYJ103	10K	1
R173	ERJ3GEYJ272	2.7K	1				
R174	ERJ3GEYJ152	1.5K	1	R241	ERG1SJ122	1.2K	1
R175	ERJ3GEYJ104	100K	1				
R176	ERJ3GEYJ562	5.6K	1				
R177	ERJ3GEYJ334	330K	1				
R178	ERJ3GEYJ121	120	1				
R179	ERJ3GEY0R00	0	1				
						(CAPACITORS)	
R180	ERJ3GEYJ562	5.6K	1	C101	ECA0JM101	100	1
R182	ERJ3GEYJ123	12K	1	C102	PQCUV1C224KB	0.22	1
R183	PQ4R10XJ391	390	S 1	C103	ECUV1C104KBV	0.1	1
R185	ERDS2TJ5R6	5.6	1	C104	ECEA1HU4R7	4.7	1
R186	ERJ3GEYJ334	330K	1	C105	PQCUV1C224KB	0.22	1
R187	ERJ3GEYJ473	47K	1	C106	ECUV1C104KBV	0.1	1
R188	ERJ3GEYJ153	15K	1				
R189	ERJ3GEYJ273	27K	1	C111	PQCUV1H105JC	1	S 1
				C112	PQCUV1H105JC	1	S 1
R190	PQ4R10XJ000	0	1	C114	ECUV1H102KBV	0.001	1
R191	ERJ3GEYJ561	560	1	C118	ECUV1H103KBV	0.01	1
R192	PQ4R10XJ822	8.2K	S 1				
R193	ERJ3GEYJ105	1M	1	C120	ECA0JM101	100	1
R194	ERJ3GEYJ683	68K	1	C123	ECUV1H103KBV	0.01	1
R195	ERJ3GEYJ682	6.8K	1	C126	ECEA1HKS100	10	S 1
R196	ERJ3GEYJ224	220K	1	C127	PQCUV1H104ZF	0.1	1
R197	ERJ3GEYJ333	33K	1	C128	ECUV1H181JCV	180P	1
R198	ERJ3GEYJ334	330K	1	C129	ECUV1H123KBV	0.012	1
R199	ERJ3GEYJ104	100K	1				
				C130	ECUV1H181JCV	180P	1
R200	ERJ3GEYJ393	39K	1	C131	ECUV1C104KBV	0.1	1
R201	ERJ3GEYJ103	10K	1				
R202	ERJ3GEYJ104	100K	1				

KX-FP270

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Ref. No.	Part No.	Value	Pcs	Ref. No.	Part No.	Value	Pcs
C132	ECUV1C104KBV	0.1	1	C202	ECUV1H472KBV	0.0047	1
C134	ECUV1C683KBV	0.068	1	C203	ECUV1H103KBV	0.01	1
C135	ECUV1H223KBV	0.022	S 1	C204	ECUV1C104KBV	0.1	1
C136	ECUV1H333KDV	0.033	S 1	C205	PQCUV1H105JC	1	S 1
C137	ECUV1H223KBV	0.022	S 1	C206	ECEA1HKS100	10	S 1
C138	ECUV1C104KBV	0.1	1	C207	ECUV1C473KBV	0.047	1
				C208	ECUV1H182KBV	0.0018	1
C140	ECUV1C104KBV	0.1	1	C209	PQCUV1H104ZF	0.1	1
C142	ECUV1H223KBV	0.022	S 1				
C145	ECUV1H682KBV	0.0068	1	C210	ECA0JM101	100	1
C146	ECUV1H272KBV	0.0027	1	C211	ECUV1H333KDV	0.033	S 1
C147	ECUV1H101JCV	100P	1	C212	ECUV1H333KDV	0.033	S 1
C148	ECUV1H222KBV	0.0022	1	C213	PQCUV1H104ZF	0.1	1
C149	ECEA1CK101	100	S 1	C214	ECEA1HKS2R2	2.2	S 1
				C215	ECKD2H681KB	680P	S 1
C150	ECUV1H821KBV	820P	1	C216	ECKD2H681KB	680P	S 1
C151	ECUV1H561JCV	560P	S 1	C217	ECEA1HKS010	1	S 1
C152	ECEA1HKS4R7	4.7	S 1	C218	ECEA1CKS470	47	S 1
C153	ECUV1C683KBV	0.068	1	C219	ECUV1C104KBV	0.1	S 1
C154	ECUV1C104KBV	0.1	S 1				
C155	PQCUV1H105JC	1	S 1	C220	ECUV1H103KBV	0.01	1
C156	ECUV1H102KBV	0.001	1	C221	ECUV1H103KBV	0.01	1
C157	ECEA1CK101	100	S 1	C222	ECUV1H103KBV	0.01	1
C158	ECUV1H103KBV	0.01	1	C223	ECEA0JKS220	22	S 1
C159	ECUV1C104KBV	0.1	S 1	C224	ECUV1H103KBV	0.01	S 1
				C225	ECUV1H332KBV	0.0033	1
C160	ECEA1HU100	10	1	C226	ECQE2E334KZ	0.33	S 1
C161	ECA0JM101	100	1	C227	ECUV1H103KBV	0.01	S 1
C162	ECUV1C104KBV	0.1	S 1				
C163	ECUV1H681KBV	680P	1				
C164	ECUV1H681KBV	680P	1				
C165	ECEA1HKS4R7	4.7	S 1				
C166	ECUV1H392KBV	0.0039	1				
C167	ECUV1H681KBV	680P	1				
C168	ECEA1EKS330	33	S 1				
C169	ECUV1H101JCV	100P	1				
C172	ECUV1C104KBV	0.1	S 1				
C173	ECUV1C104KBV	0.1	1				
C175	ECEA1HKS100	10	S 1				
C176	ECUV1H333KDV	0.033	S 1				
C178	ECUV1C104KBV	0.1	1				
C179	ECUV1C104KBV	0.1	S 1				
C180	ECUV1H153KBV	0.015	1				
C181	ECUV1H331JCV	330P	S 1				
C183	ECUV1C104KBV	0.1	S 1				
C184	ECUV1C104KBV	0.1	1				
C185	ECEA1HKS100	10	S 1				
C186	ECA0JM101	100	1				
C187	ECA0JM101	100	1				
C188	ECUV1C104KBV	0.1	S 1				
C189	ECUV1H183KBV	0.018	1				
C190	ECEA1HKS100	10	S 1				
C191	ECUV1H821KBV	820P	1				
C192	ECEA1CU221	220	1				
C193	ECUV1H271KBV	270P	1				
C194	ECUV1C104KBV	0.1	S 1				
C195	ECUV1C104KBV	0.1	1				
C196	ECEA1HU100	10	1				
C197	ECUV1H821KBV	820P	1				
C198	ECUV1H680JCV	68P	1				
C199	ECA0JM101	100	1				
C200	ECEA1VU330	33	1				

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Ref. No.	Part No.	Part Name & Description & Value	Pcs	Ref. No.	Part No.	Part Name & Description & Value	Pcs
OPERATION BOARD PARTS							
PCB3	PFLP1136MZ	OPERATION BOARD ASS'Y (RTL)	1	R381	ERJ3GEYJ563	56K	1
IC301	MN53007QAF	(IC) IC	1	R382	ERJ3GEYJ331	330	1
D363	1SS119	(DIODES) DIODE(SI)	S 1	R383	ERJ3GEYJ331	330	1
D364	1SS119	DIODE(SI)	S 1	R384	ERJ3GEYJ331	330	1
LED301~ LED303	PQVDR325CA47	LED	S 3	R385	ERJ3GEYJ101	100	1
CN301	PQJP11G43Y	(CONNECTORS) CONNECTOR, 11 PIN	1	R392	ERJ3GEY0R00	0	1
CN302	PQJS10X59Z	CONNECTOR, 10 PIN	1	R396	ERJ3GEYJ102	1K	1
SW301~ SW337	EVQ11Y05D	(SWITCHES) SWITCH	S 37	R397	ERJ3GEYJ102	1K	1
SW350	EVQVEHF1712B	SWITCH	1	C301	ECUV1C104KBV	0.1	S 1
PI301~ PI303	CNA1006N	(PHOTO COUPLERS) PHOTO ELECTRIC TRANSDUCER S	3	C302	ECEA1AKS101	100	1
R307	ERJ3GEYJ181	(RESISTORS) 180	1	C305	ECUV1H122KBV	0.0012	1
R308	ERJ3GEYJ181	180	1	C307	ECUV1H331JCV	330P	1
R309	ERJ3GEYJ181	180	1	C309	ECUV1H331JCV	330P	1
R310	ERJ3GEYJ101	100	1	C310	ECUV1H331JCV	330P	1
R311	ERJ3GEYJ181	180	1	C322	ECUV1C104KBV	0.1	S 1
R312	ERJ3GEYJ181	180	1	C331	ECUV1C104KBV	0.1	S 1
R322	ERJ3GEYJ102	1K	1	C332	ECUV1C104KBV	0.1	S 1
R323	ERJ3GEYJ273	27K	1	C351	ECUV1C104KBV	0.1	S 1
R332	ERJ3GEYJ471	470	1	C352	ECUV1C104KBV	0.1	S 1
R333	ERJ3GEYJ471	470	1	C363	ECUV1C104KBV	0.1	S 1
R334	ERJ3GEYJ471	470	1	C364	ECUV1C104KBV	0.1	S 1
R341	ERJ3GEYJ181	180	1	C365	ECUV1C104KBV	0.1	S 1
R342	ERJ3GEYJ181	180	1	C366	PQCUV1H331JC	330P	1
R343	ERJ3GEYJ181	180	1	POWER SUPPLY BOARD PARTS			
R344	ERJ3GEYJ181	180	1	PCB4	PFLP1131MZL	POWER SUPPLY BOARD ASS'Y △(RTL)	1
R345	ERJ3GEYJ181	180	1	IC101	PFVIFA5317P	(ICs) IC	1
R346	ERJ3GEYJ181	180	1	IC201	AN1431T	IC	1
R347	ERJ3GEYJ181	180	1	Q101	PQVTFS10KM10	(TRANSISTOR) TRANSISTOR(SI)	1
R348	ERJ3GEYJ101	180	1	D101	PFVD1N4005	(DIODES) DIODE(SI)	1
R361	ERJ3GEYJ181	180	1	D102	PFVD1N4005	DIODE(SI)	1
R362	ERJ3GEYJ181	180	1	D103	PFVD1N4005	DIODE(SI)	1
R363	ERJ3GEYJ103	10K	1	D104	PFVD1N4005	DIODE(SI)	1
R364	ERJ3GEYJ103	10K	1	D105	PFVDAG01A	DIODE(SI)	1
R365	ERJ3GEYJ103	10K	1	D106	1SS119	DIODE(SI)	1
R366	ERJ3GEYJ181	180	1	D107	MA4220	DIODE(SI)	1
				D108	PQVDERA1802	DIODE(SI)	1
				D201	PFVDSF5LC20U	DIODE(SI)	1
				D202	PFVDD1NL20U	DIODE(SI)	1

KX-FP270

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Ref. No.	Part No.	Part Name & Description & Value	Pcs	Ref. No.	Part No.	Part Name & Description & Value	Pcs
CN31 CN301	PQJP2D98Z PQJP6G100Z	(CONNECTORS) CONNECTOR, 2 PIN CONNECTOR, 6 PIN	1 1	R223 R224 R225	PQ4R10XJ101 PQ4R10XJ273 PQ4R10XJ332	100 27K 3.3K	1 1 1
F101 F201	PQBA1C50NBKL PFBA19372	(FUSES) FUSE FUSE	1 1				
L101 L201	ELF15N010A PQLE53	(COILS) COIL COIL	Δ 1 1				
PC101	ON3131S	(PHOTO COUPLERS) PHOTO ELECTRIC TRANSDUCER	Δ 1	C101 C102 C103 C104 C105 C106 C108 C109	ECQU2A224MG ECQU2A473MG PFKDE2GA222M PFKDE2GA222M PFKDE2GA472M EEUEB2D181U ECKD3A102KBKBP ECA1VHG470	0.22 0.047 0.0022 0.0022 0.0022 180 0.001 47	Δ 1 Δ 1 Δ 1 Δ 1 Δ 1 1 1
L103	EXCELDNR35	(COMPONENTS PARTS) COMPONENTS PARTS	1	C119 C121 C122 C123 C124	ECKD3A221KBKBP ECUV1H472KBN ECUV1C224KBX ECUV1H471JCX ECUV1H104KBW	220P 0.0047 0.22 470P 0.1	1 1 1 1 1
T101	ETS29AZ1X5AC	(TRANSFORMER) TRANSFORMER	Δ 1	C201 C202 C203 C205	EEUFA1V4/1 ECKD3A102KBKBP PFCEA16B470 ECQV1H474JL	470 0.001 47P 0.47	1 1 1 1
VR201	EVNDJAA03B53	(VARIABLE RESISTOR) VARIABLE RESISTOR	1	C222 C223	ECUV1H104KBX ECUV1H104KBW	0.1 0.1	1 1
ZNR101	ERZV10DK471U	(VARISTOR) VARISTOR	Δ 1				
R101 R102 R103 R104 R105 R106 R107 R108 R109	ERDS2TJ105 ERDS2TJ393 ERDS2TJ393 ERG1SJ473P ERX2SJR22 ERG2SJ101 PQ4R10XJ680 ERDS2FJ150 ERDS2FJ220	(RESISTORS) 1M 39K 39K 47K 0.22 100 68 15 22	Δ 1 1 1 1 1 1 1 1 1	CCD BOARD PARTS			
R121 R122 R123 R124 R125 R126 R127 R128 R129	ERDS2TJ103 PQ4R10XJ561 PQ4R10XJ561 PQ4R10XJ181 PQ4R10XJ103 PQ4R10XJ562 PQ4R10XJ102 PQ4R10XJ100 PQ4R10XJ104	10K 560 560 180 10K 5.6K 1K 10 100K	1 1 1 1 1 1 1 1 1	PCB5	PFWP2FP200M	CCD BOARD ASS'Y (RTL)	1
R130 R131	PQ4R10XJ104 PQ4R10XJ823	100K 82K	1 1	IC801	PFWP2FP200M	(ICs) CCD BOARD ASS'Y (RTL)	1
R203 R205	ERDS2TJ332 ERG1SJ222	3.3K 2.2K	1 1	Q801 ,802 Q803	2SB1218A 2SD1819A	(TRANSISTORS) TRANSISTOR(SI) [OR 2SA1576R] S TRANSISTOR(SI) [OR 2SC4155S] S	2 1
R221 R222	PQ4R10XJ222 PQ4R10XJ222	2.2K 2.2K	1 1	CN801	PQJP8G30Y	(CONNECTOR) CONNECTOR, 8P	1
				C801 C803 C804	PQCUIV1E104MD ECEA1CKS101 PQCUIV1E104MD	(CAPACITORS) 0.1 100 0.1	S 1 1 S 1

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Ref. No.	Part No.	Part Name & Description & Value	Pcs
J801	PQ4R18XJ000	(RESISTORS) 0	S 1
J802,803	PQ4R10XJ000	0	S 2
R801,802	PQ4R10XJ202	2K	S 2
R803	PQ4R10XJ100	10	S 1
R804	PQ4R10XJ242	2.4K	S 1
R805	PQ4R10XJ272	2.7K	S 1
R806	PQ4R10XJ242	2.4K	S 1
R807	PQ4R10XJ272	2.7K	S 1
R808,809	PQ4R10XJ471	470	S 2
R810	PQ4R10XJ681	680	S 1
R811,812	PQ4R10XJ101	100	S 2
R830	PQ4R10XJ000	0	S 1
VR801	EVNDXAA03B23	(VARIABLE RESISTOR) SEMI-FIXED RESISTOR, 2K	1
HOOK SWITCH AND SENSOR BOARD PARTS			
PCB6	PFLP1130MZ	HOOK SW/SENSOR BOARD ASS'Y (RTL)	1
IC401	PQVIBA12003	(ICs) IC	S 1
IC402	PQVIBA12003	IC	S 1
Q401	2SB1322	(TRANSISTORS) TRANSISTOR(SI) [OR 2SB1237]	S 1
Q402	2SB1322	TRANSISTOR(SI) [OR 2SB1237]	S 1
D401	1SS147	(DIODES) DIODE(SI)	1
D402	MA7200	DIODE(SI)	S 1
D403	1SS147	DIODE(SI)	1
D404	MA7200	DIODE(SI)	S 1
D405	1SS147	DIODE(SI)	1
D406	1SS147	DIODE(SI)	1
CN401	PQJP5G30Y	(CONNECTORS) CONNECTOR, 5 PIN	1
CN402	PQJP9G30Y	CONNECTOR, 9 PIN	1
CN403	PQJP06G100	CONNECTOR, 6 PIN	1
CN404	PQJP02G100Z	CONNECTOR, 2 PIN	1
CN405	PQJP5G30Y	CONNECTOR, 5 PIN	1
CN406	PQJP03G100Z	CONNECTOR, 3 PIN	1
CN407	PQJP3G30Y	CONNECTOR, 3 PIN	1
CN408	PQJP3G38Z	CONNECTOR, 3 PIN	1
SW401	ESE14A211	(SWITCH) SWITCH	1
PI402	CNA1006N	(PHOTO COUPLERS) PHOTO ELECTRIC TRANSDUCER	S 1
PI403	PQVIPS4506	PHOTO ELECTRIC TRANSDUCER	S 1

Ref. No.	Part No.	Part Name & Description & Value	Pcs
F401	PQBA1N025NMA	(FUSE) FUSE	1
R401	ERDS2TJ821	(RESISTORS) 820	1
R402	ERDS2TJ332	3.3K	1
R403	ERDS2TJ821	820	1
R404	ERDS2TJ332	3.3K	1
C401	ECEA1VKA220	(CAPACITORS) 22	1
FIXTURES AND TOOLS			
EC 1	PQZZ2K6Z	EXTENSION CORD, 2 PIN	1
EC 2	PQZZ2K12Z	EXTENSION CORD, 2 PIN	2
EC 3	PQZZ2K13Z	EXTENSION CORD, 2 PIN	1
EC 4	PQZZ3K5Z	EXTENSION CORD, 3 PIN	1
EC 5	PQZZ2K6Z	EXTENSION CORD, 2 PIN	1
EC 6	PQZZ3K12Z	EXTENSION CORD, 3 PIN	1
EC 7	PFZZ5K13Z	EXTENSION CORD, 5 PIN	2
EC 8	PQZZ12K4Z	EXTENSION CORD, 12 PIN	1
EC 9	PQZZ6K14Z	EXTENSION CORD, 6 PIN	1
EC10	PQZZ8K18Z	EXTENSION CORD, 8 PIN	1
EC12	PQZZ9K4Z	EXTENSION CORD, 9 PIN	1
EC13	PQZZ6K14Z	EXTENSION CORD, 6 PIN	1
EC14	PQZZ12K4Z	EXTENSION CORD, 12 PIN	1
EC15	PFZZ12K2Z	EXTENSION CORD, 12 PIN	1
EC16	PFZZ7K15Z	EXTENSION CORD, 7 PIN	1
	PFZZ2FP200M	SEPARATION SPRING HEIGHT TOOL (See P.114)	1
	PFZZ1F780M	CCD TOOL (See P.114)	1
	PFZZFP200M	SENSOR BOARD TOOL (See P.125)	1
	PFZZFP270M	SPECIAL ROM TOOL (See P.75)	1
Notes: 1. Sensor Board Tools and Extension Cords (Ref. No. EC2, EC10) are necessities for servicing. 2. Extension Cords (Ref. No. EC1, EC3-EC9, EC11-16) are useful servicing. (They make servicing easy.)			

